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# **ANALYSIS OF SMALLER UGR-A MEAL MODULES TO SUPPORT VILLAGE STABILITY OPERATIONS**

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**U.S. Army Natick Soldier Research, Development and Engineering Center  
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14. ABSTRACT  This report analyzes the economic feasibility of fielding smaller UGR-A modules to support village stability operations. An assembler provided item and case level packaging and pricing data for each menu item, from which an analysis was conducted to assess the feasibility of constructing smaller than 50 meal module menus with the same items. It was found that a significant portion of item level packaging did not facilitate smaller menu modules without an unacceptable level of excess item portions. It was concluded that since that the Army is doctrinally organized to feed at the company and battalion level and there have not been any future deployment feeding group size projections, creating a less than 50 man module menu set is not in the best interests of the Army. An alternative solution would be to mandate contractors package meal items in at least two different packages so part of a module could be consumed without having to discard large amounts of excess meal items.						
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MENUS	SMALL UNITS		FIELD RATIONS		FOOD CONSUMPTION	
MEALS	ECONOMICS		GROUP RATIONS		ECONOMIC ANALYSIS	
WASTES	GROUP SIZE		FIELD KITCHENS		FEASIBILITY STUDIES	
RATIONS	DEPLOYMENT		COST ANALYSIS		UNITIZED GROUP RATIONS	
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## **Executive Summary**

From September 2011 to September 2012, the Natick Soldier Research, Development and Engineering Center (NSRDEC) performed an analysis of alternative “less than 50 meal” Unitized Group Ration – A (UGR-A) meal modules to reduce the large discard of excess meals and components generated by the current 50 meal module to support below-company-size, small Village Stability Operation (VSO) Team field feeding operations. The present family of UGRs for field kitchen operations includes A, Heat & Serve (H&S), and B, and all three are standardized at 50 meals per menu module. This standard module size was designed to cover and support the wide range of Service field kitchen supported feeding strengths which are currently doctrinally organized and supported by a mix of company to battalion size field kitchens, but no below-company-size field kitchens. Across the Services, field kitchen feeding strengths range from a low of about 80 for the smallest battery/company kitchen to 1,000+ for the largest battalion level kitchens. Based on this wide range in supported feeding strengths and a detailed analysis of the field kitchen expected supported feeding strengths for a Mechanized Division (total strength of 17,844), the standard UGR meal module size was set at 50, as it resulted in an average over issue of just 5% across all division level kitchens.

Following the implementation of long term VSO Teams for the Afghanistan Operation Enduring Freedom (OEF), the Special Operations Forces (SOF) Command identified the need for a “less than 50 meal” UGR-A module due to the large discard (and associated wasted food cost and disposal issues) of excess unusable module meal components generated by the current 50 meal modules. The large meal component discard is attributable to the interaction of two factors: small VSO Team strengths ranging from a low of about 16, to a majority of around 25, to a max of about 33; and the packaging of several key menu items, mostly frozen entrées, that provide no flexibility or capability to safely (based on food safety procedures) break the provided 50 item portions into two or more smaller packaged subunits. For these menus, this lack of flexibility results in the need to effectively expend all 50 entrée portions, whether by serving or discarding, even if only 15 or 20 were needed to support the planned VSO Team feeding strength, as the other meal components are excess or of no value without the entrée portion to provide a complete meal.

To address the SOF identified need, six smaller modules were assessed, consisting of three smaller sizes (16 meals, 25 meals, and 33 meals) with two item levels of pack options each: (1) the current 50 meal module item unit of pack, and (2) the current module item unit of pack subunits, for items with packaged subunits. The build and analysis of the six smaller meal module alternatives were limited to and based on item cost and packaging (unit of pack, subunits, item portions) data from one UGR-A assembler. This upfront limitation was based on the unavailability of essential item level cost data for alternative items from different source vendors or item units of pack and on an assumption that the 50 meal and any smaller meal module would both need to be assembled from the same set of items to avoid the extra costs associated with separate sets of items for each meal module. Since the 50 meal module item units of pack were selected solely to meet 50 meal module item requirements, it was understood upfront that the use of same item units of pack and subunits would result in larger increases in average per-meal cost for each of the smaller meal module alternatives than if item source vendors



and units of pack were specifically selected to better match item portions for the smaller 16, 25, and 33 meal module sizes. For the build of the six smaller meal module alternatives, each menu was reviewed, and various rules were followed to minimize any excess module portions by meal component to the maximum extent possible.

For the 50 meal breakfast and lunch/dinner menus, the average total component cost per meal is \$3.97. For the 16, 25, and 33 meal modules built solely with current item 50 meal module units of pack (Option 1), the average per-meal costs were \$9.27, \$6.30, and, \$5.66, respectively, increases per meal of 134%, 59%, and 43% over the 50 meal module. With current item unit of pack subunits, the average component costs per meal were greatly reduced to \$6.65, \$5.14, and \$5.08, respectively, increases of only 68%, 29%, and 28% over the 50 meal module cost of \$3.97 per meal. The increases for both options are directly due to the included item excess portions in each size module based on each item's current 50 meal module unit of pack. Extra costs associated with excess entrée portions account for a large portion of the per-meal cost increase as they account for nearly one-half of the total 50 meal module per-meal-component cost, and for many menus the main entrée item consists of a single item unit of pack. For these menus this translates to 50 entrée portions for the 16, 25, and 33 meal modules, or a 200%, 100%, and 50% over issue of entrée portions for the menu. Though this is particularly significant with the Option 1 packaging, it is also significant with Option 2, as nearly one-third of the 24 most expensive entrée items have no subunits.

Based on the high incremental per-meal cost impacts and the small proportion of VSO Teams with expected strengths of 16 or less, only the 25 and 33 meal sizes appear to be potentially viable, and given the significantly higher excess fill associated with the Option 1 packaging, only the Option 2 alternatives merit consideration. Even with those two alternatives, however, the increased average component cost per module meal associated with the excess portions for many items still offsets some of the potential cost savings associated with smaller meal modules. Based on the \$3.97, \$5.14, and \$5.07 average component cost per meal for the current 50, the 25 Option 2, and the 33 Option 2 meal modules, respectively, the average total component cost per module is \$198.66, \$128.50, and \$167.48, resulting in component cost savings of \$70.16 and \$31.16 per smaller module, or reductions of 35% and 16%. These savings are significantly less than the 50% and 33% savings than would be expected without any increase in excess portions for the 25 and 33 meal module sizes, respectively. They would be further reduced by significant workload costs to repackage food items and significant adverse supply chain and logistical support impacts associated with the distribution and management of a second separate UGR-A group ration.

The determination of whether a 25 or 33 meal module size provides greater Service level benefit, and the determination of the best or "optimal" smaller meal module for OEF, if there is one, requires more detailed data on the magnitude and distribution of actual VSO Team strengths. Prior to making any decision relative to adding/inserting a smaller UGR-A module, the Services should assess if the need for a below-company-size (VSO Team type) UGR-A is unique to OEF or an enduring future mission requirement and, if the latter, the magnitude of the requirement to include specifics on expected distribution of below- company-size field kitchen feeding strengths. Actually developing this type of data is likely difficult to impossible with any level of confidence given that Services are not

doctrinally organized to support below-company-size field kitchens and that any future below-company-size feeding requirement will likely be dependent on future unknown deployment and mission specifics.

Based on the expected problems and issues with obtaining the required data to assess with any confidence the potential Service level benefits of alternative smaller meal module configurations, an alternative solution is modifications to the current UGR-A assembly contract specifications, which can likely provide similar and possibly greater benefits than the addition of new, smaller UGR-A meal modules while also avoiding the significant Class I supply chain industrial base and distribution impacts associated with adding and supporting another UGR-A ration. The required contract modification would simply require that for each menu's entrée meal component, all 50 meal menu modules include a minimum of two entrée item subunits (e.g. one unit of pack with two packaged subunits or two units of pack with no packaged subunits). This requirement would apply at the entrée meal component level, and not at the entrée item level. For example, a split lunch/dinner menu with two entrées, each with one unit of pack with one subunit, would meet this specification. A similar component level specification requirement would likely apply, e.g., for desserts, if the menu included a single serving of a frozen dessert item per meal. With this contract modification, all menu components, to include all frozen items, could be divided into a minimum of two or more subunits of 25 or fewer servings, resulting in an improved capability to pull, thaw, and cook/prepare required portions that more closely match required portions based on expected feeding strengths. This capability translates to a significant reduction in the expended/discarded excess entrées and other meal component portions.

While providing clear benefit for small below-company-size VSO Team type feeding missions, the UGR-A contract modification would also significantly reduce the discard of key meal components and associated complete meals for many smaller company size field kitchens depending on each kitchen's actual supported feeding strength, e.g., a field artillery battery (company) kitchen supporting 115. This unit kitchen and a menu for which the entrée is provided as one unit of pack with 50 portions and no packaged subunits results in the expenditure of 150 entrée portions and as a result 150 complete meals per meal period, which is an effective discard of 35 complete meals per meal period. However, with the contract modification and two entrée item subunits of pack per 50 meal module, 25 entrée portions can be kept frozen, and only 125 thawed/prepared, resulting in the reduced expenditure of 125 entrée portions per meal period and a 72% reduction in discarded meals, from 35 to 10.

In addition to generating benefits in reduced excess meal/component discards across all field kitchens to especially include battery and company level kitchens, the benefit of reduced component and meal discards is obtained with a single UGR-A group ration and avoids any of the adverse supply chain and logistical support issues and impacts associated with the distribution and management of a second separate UGR-A group ration.

Therefore, it is recommended that the Services not pursue any smaller UGR-A module at this time. Instead it is recommended that the Defense Logistics Agency (DLA) Troop Support explore potential UGR-A contract modifications focused on a minimum of two entrée component item units of pack or subunits per 50 meal module.

# **ANALYSIS OF SMALLER UGR-A MEAL MODULES TO SUPPORT VILLAGE STABILITY OPERATIONS**

## **1.0 Introduction**

This report documents an analysis, performed from September 2011 to September 2012 by the Natick Soldier Research, Development and Engineering Center (NSRDEC), to assess the merits/benefits of producing smaller-size Unitized Group Ration (UGR) frozen perishable (UGR-A) meal modules to potentially reduce the large discard of excess meals/portions, and associated cost, solid waste, and logistical impacts, associated with use of the current 50 meal UGR-A module configuration by below-company-size field kitchens. Due to logistical and industrial base issues associated with adding/supporting a second smaller module size, the assessment evaluated both alternative 50 meal UGR-A module specifications and six alternative “smaller than 50 meal” module configurations. The alternatives consisted of three module sizes (16, 25, and 33 meals) each with two item level of pack options: (1) item unit of pack same as for current 50 meal modules and (2) item module unit of pack includes sub units of the current 50 meal module item unit of pack.

The identified need for a smaller UGR-A meal module alternative was solely associated with the Village Stability Operation (VSO) Team field feeding mission during Operation Enduring Freedom (OEF) in Afghanistan. For this feeding mission, the 50 meal module generates a large discard of excess meals/components due to: current item unit of pack packaging and food safety concerns, especially for bulk frozen entrees. For example, for Lunch/Dinner Menu 1 the sole entrée item, fried chicken, is provided as a single bulk case with 50 portions and with no smaller packaged subunits. For this menu, the entrée items single bulk item unit of pack with no packaged smaller sub units, coupled with standard food safety procedures, results in the need to use all 50 chicken portions, serve or discard, even if only 20 or 25 portions need be prepared to support the planned meal period feeding strength. In turn, the need to discard 25 to 30 excess fried chicken portions equates to effective discard of components for 25 to 30 complete meals, as without an entrée meal component to provide a full meal, all other meal component items are also excess.

### **1.1 UGR Configuration and the Current 50 Meal Module Size**

The Unitized Group Ration (UGR) configuration concept was specifically developed to resolve Class I distribution problems during Desert Storm associated with delivering all required food items and components to field kitchens at the end of the supply chain. For Desert Storm and prior military deployments, the various individual Class I food items and ingredients for the different group rations, Heat and Serve (H&S), B, and A rations, were ordered as separate items, loaded into ISO containers, and pushed into the supply chain as separate bulk cases of individual items. All necessary Class I items had to come together at intermediate theater Class I supply points to facilitate unit level issues of all required items/components to prepare complete preset nutritionally balanced menus. For multiple reasons, but most importantly the general chaos associated with early stage deployment supply chains and the lack of any effective front end wholesale system supply chain controls, this did not happen.

Consequently, field kitchens very often did not receive all the ingredients needed to prepare a menu item, or all of the meal components for the planned preset menus, and individual units typically assembled daily menus on the fly based on whatever items/components were provided and available to work with at the field kitchen level.

With the current UGR concept, all required items for a field kitchen to prepare/serve 50 group meals for a preset menu are assembled into one set of three boxes for end-to-end (E2E) supply chain distribution. In addition to ensuring that all unit kitchens receive all required items to provide complete menus, the UGR packaging concept greatly simplified E2E supply chain front-end order placement (e.g., ordering only one item instead of many different items to prepare the same menu), and it simplified and improved efficiency of theater Class I supply point breakpoint/issue operations by reducing supply point Class I workloads, Class I truck missions, and other overall in-theater Class I combat service distribution impacts. However, there is also an unavoidable excess of item quantities and extra meals associated with the 50 meal count per module, based on actual field kitchen supported feeding strength (e.g. issue of three modules or 150 meals for kitchen feeding strength of 115) and/or variations in menu module component level fill rates and actual component level consumption rates. In addition to cost of the unused quantities is the expense and effort of discarding them.

There are presently three different UGRs used by the Army, Air Force, and Marine Corps (USMC): two shelf stable rations (UGR-H&S, UGR-B) and a frozen perishable component (UGR-A). However, the USMC relies primary on the shelf stable rations with only limited dependence on the UGR-A. The UGR configuration was initially fielded for the H&S group ration, subsequently for the A group ration, and finally for the B group ration.

The standard 50 meal UGR module size was selected as the “best size” based on the consideration of commercial and military unique item unit of pack sizes, current Services field feeding operations, and the large variation in actual field kitchen supported feeding strengths across all military unit field kitchens. At initial fielding the UGR-H&S was configured as 36 meal modules (two boxes) for the Army and Air Force and as 18 meal modules (one box) for the USMC, while the UGR-A was fielded as a 50 meal module (three boxes) and the UGR-B as a 100 meal module (six boxes). To both simplify and standardize Class I supply chains, all of the UGRs were standardized in the present 50 meal module, 3-box set.

For each Service, units are organized to operate and/or be supported by company to battalion level field kitchens. Some Army combat units, e.g., Infantry and Armor Battalions, are organized/equipped to set up and operate either one battalion level kitchen, by utilizing the unit’s Container Kitchen (CK), or multiple smaller company level kitchens by utilizing the unit’s also authorized Kitchen Company Level Field Feeding - Enhanced (KCLFF-E). The decision to operate one battalion kitchen or multiple dispersed company level kitchens is determined by the battalion commander based on unit mission, tactical conditions, and other factors. Other Army combat units, e.g., Field Artillery Battalions, are solely organized to operate battery (or company) level kitchen operations. Across all Army units, battalion level kitchens typically prepare meals to feed between 400 and 1000 people, while

company level kitchens typically prepare meals to feed 100 to 300, with a small percentage (<5%) of battery/company level kitchens preparing meals to support only 80 to 100.

For USMC field feeding, combat battalions are organized/equipped with one battalion field kitchen that can prepare all group rations (UGR-A, UGR-B, and UGR-H&S) and with two highly mobile heat on the move Tray Ration Heating Systems (TRHS) to provide a fast response UGR-H&S feeding capability to support any remote site feeding requirements. The vehicle/trailer mounted TRHS operates from the battalion field kitchen site and returns to the field kitchen location at the completion of each remote feeding mission.

As a result, actual supported field kitchen feeding strengths range from a low of about 80 for the smallest battery level kitchen to 1,000 or more for the largest battalion level kitchen. Within this large range, depending on actual feeding strength, the current 50 meal module can potentially generate a relatively large percentage of extra meals for smaller battery or company size kitchens based on current UGR issue procedures, which are to divide the supported feeding strength and to round up to determine the number of meal modules to issue for each meal period. For example, a supported feeding strength of 51 to 100 results in the issue of two UGR meal modules. Based on this, a smaller battery/company level kitchen feeding 75 or 125 results in an over issue of 25 meals or 33% and 25% extra meals, respectively. While the percentage of extra meals can be relatively large for select smaller size kitchens, a detailed assessment across all field kitchens for a Mechanized Infantry Division, with a total supported feeding strength of 17,844, revealed the 50 meal module size results in a division level over issue of only 5.4% extra meals.

The Army and USMC current field feeding systems do not include any field kitchen capability for below company size units (e.g. platoon level) to self prepare/cook UGRs (H&S, A, or B) onsite. For these separate smaller units, or elements of companies that may at times operate remotely from their parent unit, field kitchen prepared UGR rations need to be delivered from a supporting unit's field kitchen when the tactical environment permits. To both mitigate this distribution challenge and to increase the frequency of group hot meals provided to small separate remote groups, the UGR-Express (E) was recently developed and fielded. The UGR-E is a shelf stable, self heating group ration that provides 18 group meals. Being shelf stable, the UGR-Es are resupplied to the small units as part of their normal resupply cycle, and when most convenient the unit activates the built-in heaters to have a ready-to-serve group hot meal in about 30 min.

## **1.2 OEF VSO Teams**

The need for a smaller than 50 meal UGR-A module size was first identified by the Special Operation Forces (SOF) Command following the change in the Afghanistan OEF strategy that resulted in the establishment of VSO Teams at the village level. With VSOs, the strategic plan was for small SOF based teams (an SOF detachment plus attached enablers) to embed, live, and establish a long term presence at the local village level to enhance village security and stability, establish good governance and socio-economic development, and to demonstrate to the Afghan people that their government offers a better future.

For VSOs, the operational plan was for extended 6 to 9 month VSO Team tours prior to unit rotation and replacement by a follow-on VSO Team. An Army SOF detachment was the primary component of each VSO Team. Due to typical short duration missions, the SOF detachments have no organic field feeding capability. Depending on village-specific factors, the strength of each VSO team, to include the SOF detachment (strength 12) plus add-on team enablers (e.g. Psychological Operations (PSYOPS) Team, Dog Team, etc) and support team members (e.g. multi-functional logisticians, mechanics, contractor, cook, etc.) ranges from a low of about 16 to a high of about 30. The extended 6 to 9 month village tours and small, variable VSO Team strengths, resulted in the initial Army SOF identified need for a smaller footprint field kitchen to prepare up to 50 UGR-A meals, and an alternative UGR-A configuration to reduce the large quantity of excess portions/meals discarded at VSO feeding sites with the current UGR-A 50 meal configuration. While the VSO mission was initially assigned to Army SOFs, as the VSO mission expanded, other Special Forces units (USMC, Navy) and some regular Army units, for example Infantry, provided the forces for VSO Teams for other sectors of the area of responsibility (AOR). These other Special Forces and regular Army forces later also identified the need for a small footprint organic 50 meal UGR-A kitchen capability and an alternative UGR-A meal module configuration to reduce the significant discard of excess meals and meal components.

To support the VSO mission, identified problems/issues with the current 50 meal UGR-A module mostly centered around the current single bulk unit of pack (with no subunits) for the frozen main entrée component for many menus, which due to standard operating procedures based on food safety issues, translated into a large discard of excess entrée portions and associated excess meals. For example, at the end of each meal period, the standard operating procedure is to discard all leftover thawed or cooked food due to food safety concerns rather than holding it for a later meal period. As a result, if a VSO kitchen needs to prepare food for a team of 24, a UGR-A menu with one bulk entrée unit of pack (and no subunits) with all 50 entrée portions results in the effective issue/use of all 50 entrée portions to include 24 served and 26 discarded due to food safety issues. In this case, the discard of 26 entrée portions translates into the effective use/discard of 26 complete meals, even if the other meal components have two or more units of pack, due to discard of the entrée component and resulting inability to make a complete meal. For this specific VSO Team, feeding strength 24, the large entrée discard problem would be resolved if each menu module instead included two separate units of pack (e.g. two cases each with 25 portions) or one unit of pack with two subunits (e.g. one case with two inner boxes or bags with 25 portions each). With two separate entrée units of pack or subunits per 50 meal module, one 25 portion pack could be thawed/cooked and the other kept frozen for a later meal period, which would result in the over issue of just one portion/meal.

For other meal components, the discard of excess portions is less of an issue, as most menu items already include at least two or three units of pack or subunits. For example, canned vegetables are provided as three #10 cans, and most desserts/pastries are provided as separate packaged trays each with 10 to 16 portions or as individual portion packaged items.

### **1.3 Selection of Alternative UGR-A Module Sizes for Evaluation**

Determination of an optimal “less than 50 meal” module size to support the VSO Team type feeding need requires detailed insight/data relative to (1) the distribution of actual VSO Team strengths across all VSO sites, by VSO Team variability in actual day-to-day available-to-eat supported feeding strengths, and (2) current by-menu-component detailed data on availability of alternative size units of pack to include portions or count and cost per unit. However, efforts to obtain actual VSO site-by-site supported feeding strengths across all Afghan AOR sectors were unsuccessful with cited rationale being security issues associated with detailed VSO Team strengths. In addition, for multiple reasons, the required efforts to obtain detailed cost data for alternative component level units of pack are outside both the NSRDEC mission area and the scope of this project.

### **1.4 Contract for Assembly of Alternative UGR-A Configurations**

The 50 meal UGR-A menus are revised once per year as a result of the Combat Feeding Directorate UGR continuous product improvement (CPI) program. As part of the CPI program, new candidate menu items are continuously evaluated in-house, and a subset of selected candidate items is subsequently field tested and evaluated during an annual field test during a regularly scheduled unit field training exercise. Based on Warfighter item ratings and feedback from the field test, the Joint Service Operational Ration Forum updates the UGR-A menus to include the addition of new, higher rated items to replace lower rated items, changes in item portion sizes, item fill rates/portions per module, etc. The revised updated UGR-A menus are then incorporated into the annual Defense Logistics Agency Troop Support (DLA-TS) contracts awarded to three separate regional UGR-A assembly contractors to source all required UGR-As to support worldwide unit field training and deployment operation demands.

Based on current contract specifications, each assembler may source specific menu items from the same or different source vendors, resulting in some differences in items at the menu item level between UGR-A assemblers. Other potential item level differences include item unit of pack level, item portions per unit of pack, packaged subunits per item unit of pack, and cost per item portion. For example, for a set menu, Assembler 1 sources the required 50 chicken breast portions from Vendor A as a single item unit of pack with 50 portions, while Assembler 2 may source and provide the item from Vendor B as two smaller item units of pack, each with 25 portions. Also, an assembler may source a specific menu item from different suppliers over time due to pricing and other factors, resulting in different source vendors and item units of pack for the same assembler over a contract period.

Due to the variations in item level details between UGR-A assemblers and over time, to limit the required data collection, it was decided to set and lock the assessment of each module alternative based on the component level details (unit of pack, portions per unit of pack, and unit cost) for all menus for one UGR-A assembler at one time. This decision was based on UGR-A project officers’ experience that the items for most components are the same or very similar between assemblers and an assessment based on component level data for each assembler would likely be quite similar.

## 2.0 Analysis, Methodology, and Results

The DLA Troop Support FY11 UGR-A 50 meal module contract menus were utilized as the baseline to evaluate the potential merits and impacts of alternative UGR-A meal module configurations to more effectively support VSO Team type field feeding missions. This detailed item level data provides the basis to develop baseline module metrics to assess the effectiveness, impacts, and tradeoffs of alternative UGR-A module configurations to better support Village Stability Operation (VSO) Team type field feeding operations. The three smaller module sizes, 16 meals, 25 meals, and 33 meals, cover the range of expected VSO Team strengths and equate to the smallest, most typical, and largest expected Afghan VSO team strengths. The key metrics or criteria used in this analysis to evaluate the smaller 16, 25, and 33 meal module options were:

- Average food cost per UGR-A menu in current 50-meal module (Section 2.1)
- Average excess meal component portions based on current item unit of pack details and associated cost per meal and cost per module and potential cost savings for each smaller module alternative, as compared to 50 meal module costs (Section 2.2)
- UGR-A assembly workload impact generated by utilizing unit of pack subunits (Section 2.3)
- UGR-A industrial base/supply chain logistical support impacts (Section 2.4)

Costs were not calculated for the workload and logistical impacts associated with the build and use of the alternative modules, but the sources of those impacts and their potential magnitude for the various food items in those modules were explored and are discussed in Sections 2.3 and 2.4, respectively.

### 2.1 Composition and Meal Cost of Baseline 50 Meal Menu Modules by Meal Component

The 50 meal module contained 7 breakfast menus and 16 lunch/dinner menus. Table 1 lists the 23 menus and their total landed cost for the FY11 contract UGR-A menus for the selected UGR-A assembler at the time when assembler item level data was requested to support this analysis. The costs presented here reflect assembler component costs only and do not reflect any add-on contract module assembly costs or final transportation delivery costs that are destination specific. As shown, total component costs for the breakfast menu module ranged from \$150.26 to \$216.46 and averaged \$175.25, while for the lunch/dinner type menus costs total component costs ranged from \$157.47 to \$311.15 and averaged \$222.07. Assuming an equal total demand for breakfast and lunch/dinner meal menu modules, the average FY11 UGR-A cost is calculated to be \$198.66 per module which equates to \$3.97 per meal.

Table 2 shows, for both the breakfast and lunch/dinner menus, the minimum, maximum, and average total cost per module for each of the eight meal components: entrée, starch, vegetable (lunch/dinner menu only), dessert, beverage, condiments, spices, and accessories. The average total component cost per 50 meal breakfast menu module ranged from \$150 to \$216 and averaged \$175, and the cost of the lunch/dinner menus ranged from \$157 to \$311 and averaged \$222. Figure 1 depicts the average total cost per meal (\$3.97) by meal component.

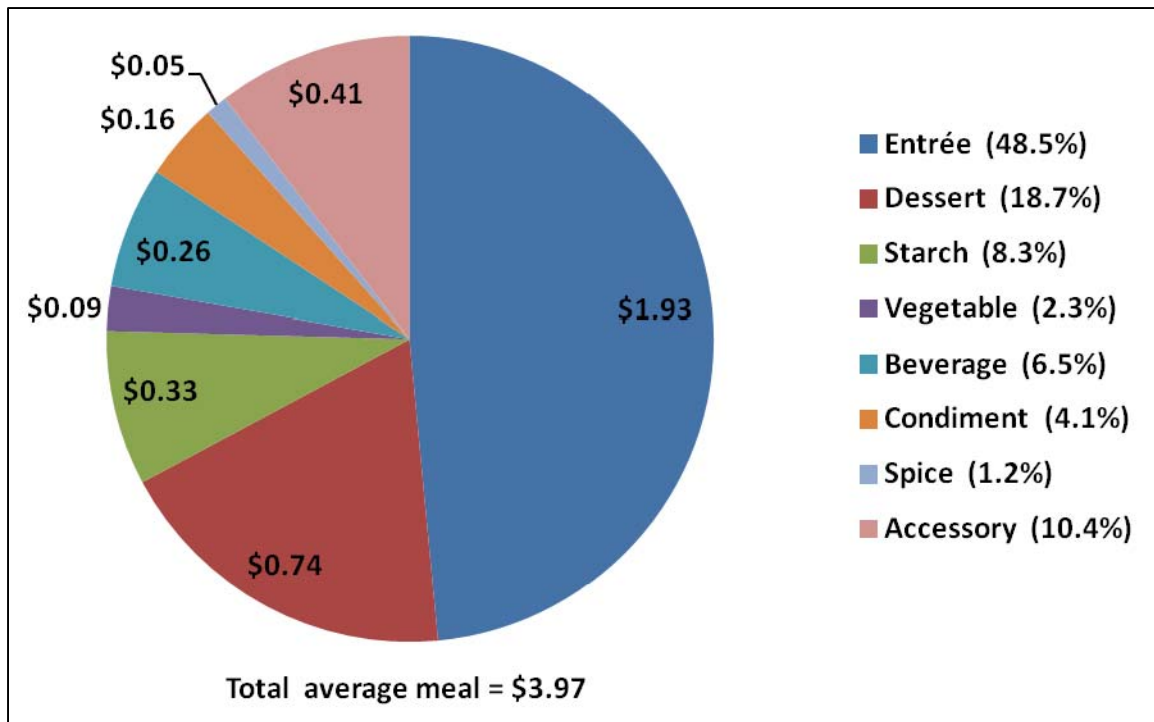


**Table 1. FY11 UGR-A 50 Meal Module Costs by Menu**

<b>Menu</b>	<b>Cost</b>
Breakfast 1	\$175.49
Breakfast 2	\$199.55
Breakfast 3	\$216.46
Breakfast 4	\$150.26
Breakfast 5	\$152.74
Breakfast 6	\$155.31
Breakfast 7	<u>\$176.95</u>
<b>Breakfast Menu Average</b>	<b>\$175.25</b>
Lunch/Dinner 1	\$229.06
Lunch/Dinner 2	\$246.47
Lunch/Dinner 3	\$206.84
Lunch/Dinner 4	\$201.97
Lunch/Dinner 5	\$198.94
Lunch/Dinner 6	\$225.65
Lunch/Dinner 7	\$298.56
Lunch/Dinner 8	\$247.81
Lunch/Dinner 9	\$157.47
Lunch/Dinner 10	\$173.87
Lunch/Dinner 11	\$251.85
Lunch/Dinner 12	\$311.15
Lunch/Dinner 13	\$245.13
Lunch/Dinner 14	\$176.79
Lunch/Dinner 15	\$184.69
Lunch/Dinner 16	<u>\$196.82</u>
<b>Lunch/Dinner Menu Average</b>	<b>\$222.07</b>
<b>Breakfast-Lunch/Dinner Average Module</b>	<b>\$198.66</b>
<b>Breakfast-Lunch/Dinner Average Meal</b>	<b>\$3.97</b>

**Table 2. FY11 UGR-A 50 Meal Module Costs by Meal Component**

<b>Meal Component</b>	<b>Breakfast Items</b>				<b>Lunch/Dinner Items</b>			
	<b>Min</b>	<b>Max</b>	<b>Avg</b>	<b>% Avg \$</b>	<b>Min</b>	<b>Max</b>	<b>Avg</b>	<b>% Avg \$</b>
Entrée	\$46.06	\$143.35	\$84.73	48.4%	\$44.14	\$218.26	\$107.92	48.6%
Starch	\$4.00	\$45.08	\$19.26	11.0%	\$0.00	\$52.04	\$13.52	6.1%
Vegetable	\$0.00	\$0.00	\$0.00	0.0%	\$0.00	\$32.63	\$9.25	4.2%
Dessert	\$11.10	\$36.93	\$22.84	13.0%	\$32.79	\$76.29	\$51.44	23.2%
Beverage	\$13.27	\$19.26	\$15.59	8.9%	\$5.55	\$12.43	\$10.27	4.6%
Condiments	\$3.57	\$16.12	\$9.13	5.2%	\$1.86	\$17.37	\$7.25	3.3%
Spice	\$2.09	\$3.12	\$2.60	1.5%	\$1.11	\$3.56	\$2.02	0.9%
Accessories	\$21.10	\$21.10	\$21.10	12.0%	\$20.39	\$20.39	\$20.39	9.2%
<b>Per Module</b>	<b>\$150.26</b>	<b>\$216.46</b>	<b>\$175.25</b>	<b>100.0%</b>	<b>\$157.47</b>	<b>\$311.15</b>	<b>\$222.06</b>	<b>100.0%</b>



**Figure 1. Average Per-Meal Component Cost of All Current 50 Meal UGR-A Menu Modules (Breakfast and Lunch/Dinner Menus Combined)**

As shown in Figure 1, three of the components (entrée, dessert, and accessories) accounted for \$1.93 (48.5%), \$0.74 (18.7%), and \$0.41 (10.4%) of the total module cost, respectively, and together a combined 77.6% of the total average per-module component cost (73% for breakfast and 81% for lunch/dinner). Based on this insight, it is important that current packaging (units of pack, subunits) of items for these three module components permit a close match between provided and required item portions for the smaller meal module alternatives to minimize any extra costs associated with excess item portions. It will be particularly important for the entrée item packaging, as the entrée component accounted for a large 48.5% of the total meal component costs (48.4% for breakfast and 48.6% for lunch/dinner).

Table 3 lists the range and average number of items per each menu for each meal component. The 7 breakfast menus include 68 different items, and the 16 lunch/dinner menus include 138 different items. The items are listed by meal component in Appendix A. Across the breakfast and lunch/dinner menu item sets, some items are a component in multiple (or all) menus. This explains why the average number of meals per each menu listed in Table 3 far exceeds the total number of items per 50 meal component when the average per menu is multiplied by the number of menus (e.g., 25.4 breakfast items per each of 7 menus = > 68 total breakfast items). Examples of items in just one menu include all entrée items; items in multiple but not all menus include instant rice, peanut butter and jelly packs, canned corn, and hot sauce; and items in every menu include salt, pepper, creamer, and all of the accessory items (trays, cups, dining packs, plastic bags, and gloves).

As detailed in Table 3, the total items per 50 meal module breakfast menu ranged from 24 to 28 and averaged 25.4 while for the lunch/dinner menu modules the total items ranged from 20 to 29, and averaged a lower 22.3. In comparing breakfast and lunch/dinner menus, one clear difference is the average number of entrée items per menu with 3.6 and 1.6 items per breakfast and lunch/dinner menu respectively. This is because most breakfast menus included four entrée category items: eggs, another non-meat item (e.g. pancakes/French toast), and a choice of two meat type items.. In comparison, most lunch/dinner menus included a single (no choice) entrée item, although some split menus provided a choice between two entrée options. Only two menus included two entrée category items per meal, e.g., hamburgers and hot dogs.

**Table 3. Number of Items per Menu in FY11 UGR-A 50 Meal Module by Meal Component**

Meal Component	Breakfast Items			Lunch/Dinner Items		
	Min	Max	Avg	Min	Max	Avg
Entrée	3	5	3.6	1	4	1.6
Starch	1	4	2.4	0	3	1.3
Vegetable	0	0	0.0	0	2	1.0
Dessert	1	2	1.3	2	3	2.4
Beverage	3	4	3.3	2	3	2.9
Condiments	4	6	5.1	2	6	3.7
Spice	4	6	4.7	3	7	4.4
Accessories	5	5	5.0	5	5	5.0
<b>Per Menu</b>	<b>24</b>	<b>28</b>	<b>25.4</b>	<b>20</b>	<b>29</b>	<b>22.3</b>

## 2.2 Cost of Excess Item Portions

The first step in calculating the second cost component, cost of excess item portions, of the six alternative modules was to identify the item cost and packaging of each item of the 50 meal module (Section 2.2.1). The item level packaging data was then used to determine the number of units of pack needed to provide the required portions for each of the smaller modules (Section 2.2.2). Next, the number of subunits per item was used to identify the number of excess portions for each alternative (Section 2.2.3). Finally, the item costs identified in Section 2.2.1 were applied to the number of excess portions (Section 2.2.4).

### 2.2.1 Item Cost and Packaging of Baseline 50 Meal Modules

Each item's actual cost cannot be provided, as it represents unreleasable, proprietary contracted data. Therefore, for each item, cost quintile ratings were developed to provide insights to each item's relative total cost for all breakfast or for all dinner menus. A Cost Quintile 5 rating indicates the item is one of the 20% of items with the highest total item cost across all menus, while a Quintile 1 rating indicates the item is one of the 20% of items with the lowest total cost across all menus. Because item cost impact is a key metric for the evaluation of alternatives, item cost quintile ratings were separately developed for each breakfast and dinner menu item to provide insight to each item's total relative cost across each set of menus. The resulting associated quintile rating item cost ranges and

average cost are presented in Table 4 for both breakfast and dinner menu items. The quintile for each of the 68 breakfast menu items and the 138 lunch/dinner items are included in Appendix A.

For both breakfast and lunch/dinner menu items, the Cost Quintile 5 items alone accounted for more than 50% of the total component cost, and the average cost per item for Cost Quintile 5 items was much higher than that for the next lower Cost Quintile 4 items. For breakfast menu items, the average cost per Cost Quintile 5 item of \$48.98 was about 2.5 times that for the Cost Quintile 4 items of \$19.76. For the lunch/dinner menu items, the average cost per Cost Quintile 5 item of \$79.17 was about three times that for the Cost Quintile 4 items of \$26.86. The Cost Quintile 5 items alone accounted for 56% and 62% of the total breakfast and lunch/dinner menu component costs, respectively. The Cost Quintile 4 and 5 items combined accounted for 75% and 83% of the total average breakfast and lunch/dinner meal component costs, respectively.

**Table 4. Breakfast and Lunch/Dinner Menu Item Cost Quintile Ranges**

Item Relative Cost Quintile	Item Total Cost - All Menus Range					
	Breakfast Items			Lunch/Dinner Items		
	Min	Avg	Max	Min	Avg	Max
5	\$26.51	\$48.98	\$153.58	\$36.60	\$79.17	\$218.26
4	\$14.80	\$19.76	\$25.27	\$20.26	\$26.86	\$35.18
3	\$10.06	\$12.15	\$14.54	\$8.73	\$13.01	\$19.50
2	\$3.97	\$6.54	\$9.40	\$5.18	\$6.92	\$8.69
1	\$0.37	\$2.88	\$3.96	\$0.36	\$2.13	\$5.02

Tables 5 and 6 detail the number of items by cost quintile for the 7 current 50 meal breakfast menus and the 16 lunch/dinner menus, respectively. Half (7 out of 14) of the Cost Quintile 5 breakfast menu items were entrée items, and a majority (17 out of 28) of the Cost Quintile 5 lunch/dinner menu items were entrée items. The only other meal component with more than two Cost Quintile 5 items was the lunch/dinner dessert component with seven items. The accessory component for the breakfast and lunch/dinner meals both included two Cost Quintile 5 items – trays and dining packets.

**Table 5. UGR-A 50 Meal Breakfast Menus - by Meal Component Item Cost Quintiles**

Meal Component	Number of Items	No. Items by Cost Quintile (5=Highest, 1=Lowest)				
		5	4	3	2	1
Entrée	18	7	6	4	1	0
Starch	9	2	2	1	4	0
Vegetable	0	0	0	0	0	0
Dessert	9	2	2	5	0	0
Beverage	10	1	1	2	2	4
Condiments	11	0	0	3	2	6
Spice	6	0	0	0	2	4
Accessories	5	2	1	0	1	1
<b>Total</b>	<b>68</b>	<b>14</b>	<b>12</b>	<b>15</b>	<b>12</b>	<b>15</b>

**Table 6. UGR-A 50 Meal Lunch/Dinner Menus - by Meal Component Item Cost Quintiles**

<b>Meal Component</b>	<b>Number Items</b>	<b>No. Items by Cost Quintile (5=Highest, 1=Lowest)</b>				
		<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Entrée	25	17	4	4	0	0
Starch	18	1	2	6	8	1
Vegetable	8	1	2	3	2	0
Dessert	30	7	15	7	1	0
Beverage	19	0	2	3	10	4
Condiments	21	0	1	3	2	15
Spice	12	0	0	1	3	8
Accessories	5	2	1	1	1	0
<b>Total</b>	<b>138</b>	<b>28</b>	<b>27</b>	<b>28</b>	<b>27</b>	<b>28</b>

As the entrée component accounts for a large percentage of the total per-meal costs, mismatches between provided and required entrée item portions for the smaller size modules based on current item packaging will likely account for a large portion of any extra total meal cost. Table 7 lists all Cost Quintile 5 breakfast and lunch/dinner entrée items along with the item unit of pack and total subunit quantities per 50 meal module. The item unit of pack represents the quantity of each item for 50 meals based on the item level of pack as presently placed into the 50 meal module. This packaging information is listed for all items in Appendix A. Based on how each item is actually packaged, some items can be broken into smaller subunits to better match the required portions for the smaller meal module sizes. For each item, the total subunit number is obtained by multiplying the item unit of pack quantity per 50 meal module by the number of item subunits per unit of pack. For example, an item with two subunits per 50 meal module could have one unit of pack with two subunits (capable of being split in two), or two units of pack each with one subunit (no capability to split). For 50 meal module split entrée menus, e.g., 25 portions of beef brisket and 25 portions of barbeque pork, the listed item subunits are based on a single entrée menu with 50 total portions. This is based on the decision that for smaller module sizes, the menu would revert to a single entrée if it reduced total excess entrée portions.

Each item's 50 meal module current unit of pack and subunits directly impacts each item's resulting total portions and excess portions for each smaller meal module. As Table 7 shows, 7 (breakfast chicken, chipotle bacon, shelf stable bacon, beef patties, chicken cordon blue, enchilada kit, and fried chicken) of the 24 Cost Quintile 5 entrée items had only one unit of pack with no subunits per current 50 meal module. This packaging resulted in 50 total entrée portions for the 16, 25, and 33 meal modules, which equates to overfill rates of 200%, 100%, and 50%, respectively, for those 7 items. However, the other 17 items had subunits (11 with subunits in a single unit of pack and 5 with multiple units of pack) that facilitated a reduction in excess portions per module. For example, the burgundy beef item had five subunits that allowed breaking the module into 10 portion increments. This meant that the 16, 25, and 33 burgundy beef meal modules would have two, three, and four subunits, (i.e., 20, 30, and 40 item portions), respectively, resulting in a much lower 20% -25% entrée portion over issue at each module size. An item with two total subunits per 50 meal module resulted in an exact item fill for the 25 meal module and 50% excess portions for the 16 and 33 meal modules. An item with three

subunits (though there were no Cost Quintile 5 entrée items with exactly three subunits) resulted in an exact item fill for the 16 and 33 meal module sizes and a 33% excess fill for the 25 meal module. An item with four subunits resulted in an exact item fill for the 25 meal module size and 50 % and approximately 12% overfill for the 16 and 33 meal modules, respectively. An item with six subunits or multiples of six resulted in an exact item fill for all three alternative module sizes.

**Table 7. Cost Quintile 5 Entrée Items - Units of Pack and Subunits per 50 Meal Module**

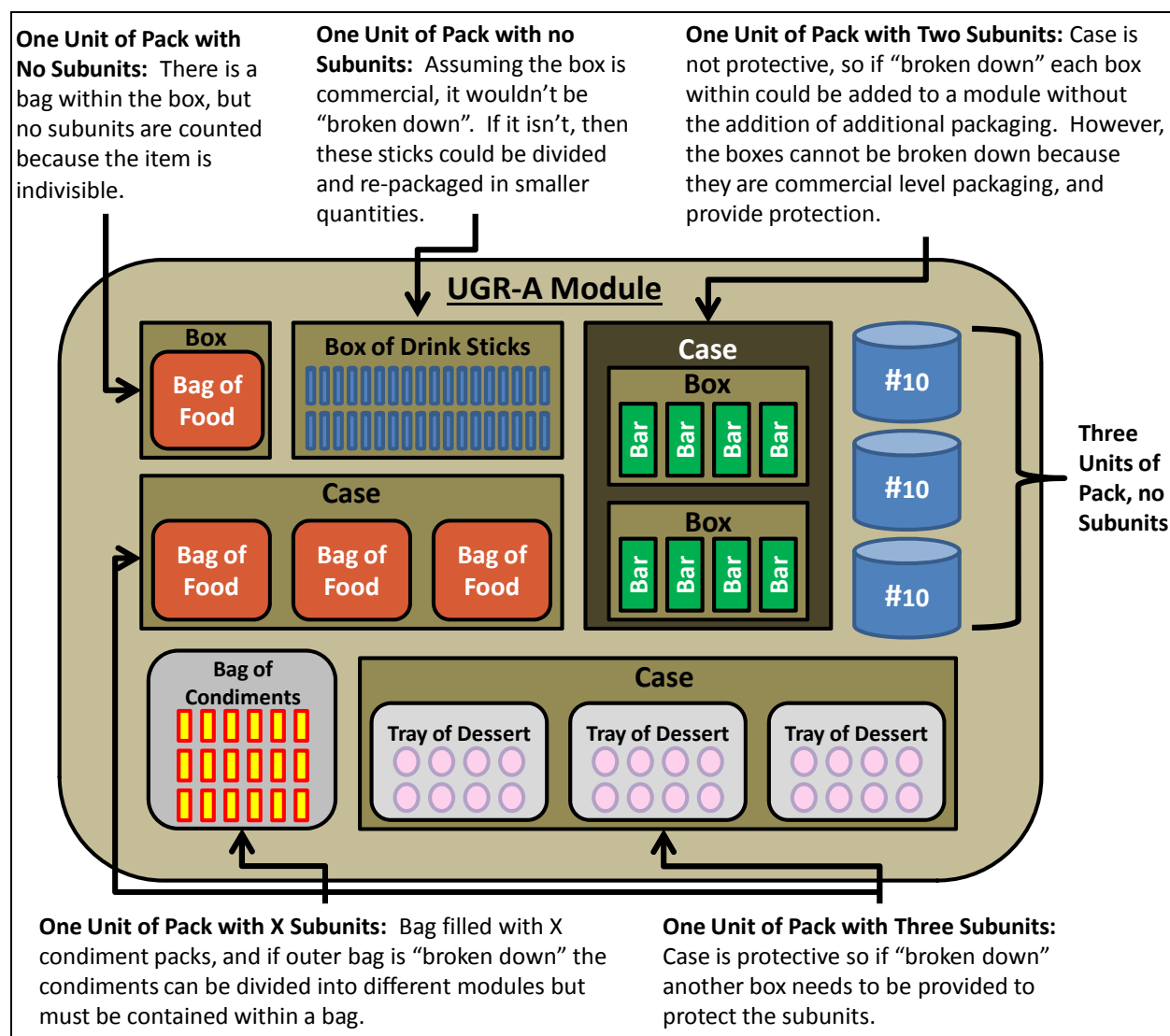
Menu	Cost Quintile 5 Items	50 Meal Module Item Quantities	
		Unit of Pack	Total Subunits
<b>Breakfast</b>	Breakfast Chicken	1	1
	Chipotle Bacon	1	1
	Shelf Stable Bacon	1	1
	Beef Breakfast Skillet	1	2
	Egg Mix	1	2
	Ranchero Beef Steak	1	4
	Tri Tip Steak	1	5
<b>Lunch/Dinner</b>	Beef Patties	1	1
	Chicken Cordon Blue	1	1
	Enchilada Kit	1	1
	Fried Chicken	1	1
	Chinese Beef & Vegetable	1	2
	Macaroni & cheese*	2	8
	Beef Prime Rib	1	5
	Burgundy Beef	1	5
	Mini Meat Loaf	1	5
	NY Strip Steaks	1	5
	Turkey Cutlet	1	5
	Teriyaki Chicken/Spicy Wings	1	10
	Chicken Jerk Style*	2	2
	Pork Rib Slabs*	2	2
	Penne Alfredo*	2	8
	Shrimp Scampi*	2	12
	Beef Brisket*	4	4

\*Part of split entrée menus with 25 portions/entrée. Therefore the unit of pack and total subunit quantities are 2 times those listed in Appendix A to provide 50 total portions.

### **2.2.2 Determination of Item Subunits per Item Unit of Pack for Alternative Modules**

The alternative UGR-A module sizes were analyzed under two different assumptions: (1) that the current unit of pack for each item can be broken down (opened) and the subunits (second level packaged items) can be packed in alternative module sizes and (2) that when only the current unit of pack can be used, no breakdowns can occur. Subunits occur when there is at least one additional layer of packaging between the unit packaging for the current 50 portion UGR-A module and the actual food

item or accessories inside (case of boxes, bags, etc.) In addition, based on standard assembly procedures with the current 50 meal modules, it was decided that retail size packaged components (e.g., box of 10 individual cocoas, 4 pack of individual fruit or pudding cups, etc), would not be broken down below their retail size package of one subunit even if the internal packaging permitted. For all other items, the determination of subunits per unit of pack was based on the requirement for one unopened layer of packaging based on food safety concerns to avoid potential contamination of the actual food product or direct contact accessory (plates, cups, etc) during the module assembly process. For example, a case with one internal bag with 50 frozen chicken portions provided no option for subunits, as opening the bags would present potential for contamination of the plates/cups during repackaging and assembly. Subunits can contain one or more portions of food depending on the item. The UGR-A item portions by item level of pack and module size are listed in seven tables in Appendix B. A hypothetical UGR-A module is shown in Figure 2. Rules for building the smaller alternative modules based on the UGR-A module are illustrated and described in Appendix B.



**Figure 2. Hypothetical UGR-A Module**

For the Option 1 alternatives, each smaller module size was configured and built by solely utilizing the same item level unit of pack as presently utilized for the 50 meal module, even if an item's unit of pack included subunits that facilitated smaller subunits to reduce excess item portions per meal module. For the Option 2 alternatives where current 50 meal module packaging permitted, item unit of pack packaged subunits were utilized to the maximum extent possible to reduce excess item portions per meal module. The one exception, based on assembly practices for the 50 meal modules, was that retail size packaged items (4 pack of fruit or pudding cups) would not be broken below their retail package size into subunits to reduce excess portions even if item packaging permitted. Current item packaging details and potential food safety issues for each Option 2 alternative were assessed to determine if the item's current packaging facilitated smaller item packaged subunits with fewer portions. The following item examples provide insight into the determination of item subunits per current unit of pack by item and the resulting impact on excess item portions per meal module alternative:

Chicken Cordon Bleu (Lunch/Dinner 14) This item's current unit of pack is a bulk case with 50 total portions and no smaller internal packaged item subunits. Based on assembler food safety issues, it was determined there was no capability to break this item into two or more subunits with fewer item portions. This determination translates to one item subunit per current item unit of pack, and as a result, 50 item portions for the 16, 25, and 33 meal Option 1 and Option 2 alternatives. Based on item level module assembly food safety issues, the same module build out decision logic was applied to all frozen item case level units of pack with no internal packaged item subunits.

New York Strip Steak (Lunch/Dinner 7) This item's present unit of pack is a case with 50 total portions to include five internal packaged subunits with 10 portions each. For the Option 2 alternatives, the smaller subunits resolved potential assembler safety issues associated with breaking the current 50 portion case into smaller 10 portion increments. As a result, for this item, the 16, 25, and 33 meal modules each got 50 portions for the Option 1 alternatives and a reduced 20, 30, and 40 portions for the corresponding Option 2 alternatives. This item example demonstrates the impact and benefits of unit of pack subunits to significantly reduce excess item portions for the Option 2 alternative for each smaller meal module size.

Canned Corn (multiple menus) For the 50 meal module, this item's unit of pack is three #10 size cans. As with any multiple-portion can or bottle item, there is no assembler ability to break the item's unit of pack into subunits with fewer portions. For this item, the build of the smaller meal modules resulted in one #10 can for both 16 meal options, two #10 cans for both 25 meal options, and also two #10 cans for both 33 meal options.

Nutrigrain Bars (Breakfast 4) For the 50 meal module, this item's unit of pack is one case with six inner retail size boxes (subunits) each with eight individual wrapped portions. To build the smaller meal module alternatives, it was decided to maintain current standard 50 meal module procedures which break retail size packaged items with individual packaged items below the retail package unit even though the individually packaged item portions eliminate any assembly operation food safety issues. Based on this, the Nutrigrain Bar case unit of pack has six packaged item subunits each with eight



portions. For the resulting build out of the smaller menu modules, the 16, 25, and 33 meal Option 1 alternatives each received a full case with 48 total item portions; while the Option 2 alternatives were each packaged in two, three, and four retail boxes or 16, 24, and 32 item portions each.

Dining Packets (All Menus) Each menu of the 50 meal modules has two plastic bags each containing 25 individually packaged dining packets. The current 25 count bags do not represent retail size packages, but instead are assembled from bulk item cases. As each dining packet is individually packaged, each bag provided 25 packaged subunits to permit an exact fill for the smaller Option 2 meal modules with no assembler level item safety or contamination issues. Based on the 25 dining packet subunits per item unit of pack, the 16, 25, and 33 meal Option 1 alternatives each got 25, 25, and 50 dining packets, respectively, while the build of the same size Option 2 alternatives resulted in an exact match of 16, 25, and 33 dining packets each.

Trays (All Menus) As with dining packets, the unit of pack for each menu module is two plastic bags each containing 25 fiberboard trays. However, unlike the dining packets, the trays are not individual packaged or protected, resulting in potential safety and surface contamination concerns associated with opening the current 25 tray bags, counting, and repackaging of the required number of trays into another bag for the Option 2 alternatives. Thus, it was determined that the current 25 tray bags provided no opportunity for smaller subunits with fewer trays. Based on this, build out of the 16, 25, and 33 meal module alternatives resulted in the same 25, 25, and 50 trays per menu for both the Option 1 and Option 2 alternatives.

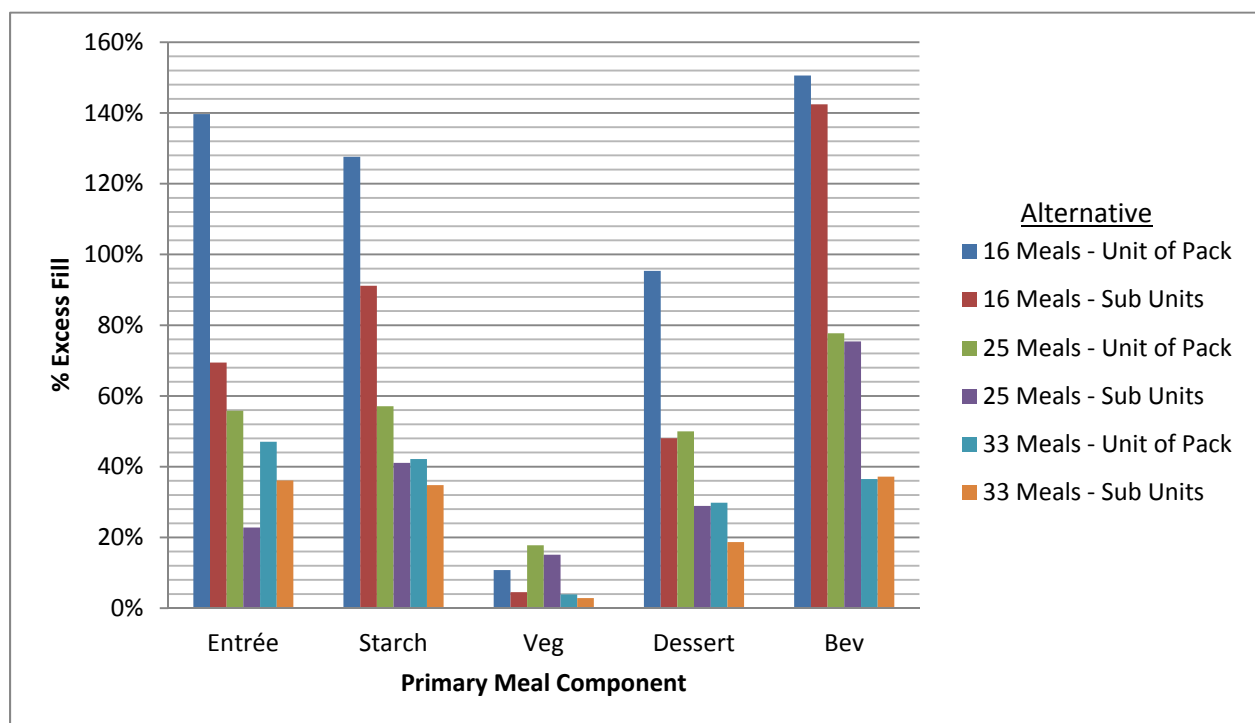
In addition to item portions or counts per unit of pack and per subunit, two other menu factors were considered to set/determine both resulting item level quantities and to reduce total excess item portions for each module alternative: (1) individual item level fill rates resulting from split entrée menus with a choice between two entrée items (25 portions of each entrée) and (2) by-meal-component total portions per meal with servings of two or more items per meal. An example of the former factor is current 50 meal Lunch/Dinner 8 menu, which is a split entrée menu with 25 portions of chicken jerk style (one case – no subunits) and 25 portions of pork ribs (one case – no subunits). To reduce the total excess entrée portions for this specific menu, the Lunch/Dinner 8 menu was changed to a single entrée menu (chicken jerk style- 25 total portions) for the 16 and 25 meal module sizes and remained as a split entrée menu for the 33 meal module (25 portions of each entrée). An example of the latter factor is the Breakfast 7 menu 50 meal module, which provides two separate meat portions per meal: 50 beef breakfast skillet portions (one case, two subunits with 25 portions each) and 50 sausage portions (one case, no packaged subunits). To reduce total excess meat portions for this menu, the 16 and 25 meal modules were built as single meat menus (beef breakfast skillet – 2 portions per meal) while the 33 meal modules were built as two meat menus, each with 50 portions.

### **2.2.3 Excess Item Portions of Alternative Modules by Primary Meal Component**

The 50 meal UGR-A modules are mostly assembled from standard commercial unit of pack items and military unique contract packaged items. A few items are assembled/repackaged by the UGR-A assembler from bulk commercial product cases. The current UGR-A contracts specify the required items and item portions/count per 50 meal module with no detailed specification on item unit of pack or

portions per unit of pack or packaged subunit. For the commercial items, available unit of pack sizes (item portions/counts) can vary by item and also by source vendor. The impact is that some of the items in the 50 meal menu modules are filled with one item unit of pack with no packaged subunits, some are filled with a single item unit of pack with multiple packaged subunits, others with multiple item units of pack each with no packaged subunits, and still others with multiple item units of pack each with subunits. Because of these variations in item level packaging, the build of the smaller 16, 25, and 33 meal module alternatives utilizing current 50 meal module items resulted in large variations in excess portions by menu and by item across the six smaller module alternatives. For example, an item with one unit of pack and no subunits for the current 50 meal module generates 200%, 100%, and 50% excess item portions for the 16 meal, 25 meal, and 33 meal module options, respectively. Likewise, an item with one unit of pack and two subunits using the Option 1 also results in the same excess portions because subdivision into the two subunits is not permitted. However, using Option 2, where subdivision is permitted, the excess portions are reduced to 50% in the 16 meal module, are completely eliminated from the 25 meal module, and remain at 100% in the 33 meal module.

The average excess fill rates for each of the six alternative modules are compared in Figure 3 by the five main meal components: entrée, starch, vegetable, dessert, and beverage. Those average rates are broken down by breakfast and lunch/dinner menu modules in Table 8, which also lists the portions per menu module. The supporting data for Table 8 are presented in the seven tables in Appendix B. (Those tables include the item, portions, portions per 50 meal module, and level of pack quantity for each item of the 23 total menus for the entrée, starch, and dessert meal components and for each of the breakfast accessory items.)



**Figure 3. Excess Fill Rate (%) by Primary Meal Component**

**Table 8. Average Meal Component Portions per Module by UGR-A Alternative**

Menu	Meal Comp	Portion/ Factor	50 Meal Module	Portions per Smaller Meal Module Alternative					
				Current Item Unit of Pack			With Unit of Pack Subunits		
				16 Meal	25 Meal	33 Meal	16 Meal	25 Meal	33 Meal
Breakfast	Entrée	Avg./Meal % Over Issue	2.87 ---	6.34 121%	4.19 46%	4.25 48%	4.50 57%	3.29 15%	4.05 41%
	Starch	Avg./Meal % Over Issue	2.05 ---	5.51 169%	3.53 72%	3.1 52%	4.39 115%	3.06 50%	2.87 40%
	Veg	Avg./Meal % Over Issue	0.00 ---	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
	Dessert	Avg./Meal % Over Issue	0.79 ---	1.42 79%	1.18 49%	1 26%	1.21 52%	1.09 37%	0.96 21%
	Bev	Avg./Meal % Over Issue	2.46 ---	5.72 133%	4.17 70%	3.25 32%	5.32 117%	4.05 65%	3.28 34%
	Cond	Avg./Meal % Over Issue	4.27 ---	10.88 155%	6.97 63%	6.2 45%	5.15 21%	4.47 5%	4.42 4%
Lunch/ Dinner	Entrée	Avg./Meal % Over Issue	1.03 ---	2.67 159%	1.71 66%	1.51 46%	1.88 82%	1.35 31%	1.36 32%
	Starch	Avg./Meal % Over Issue	1.18 ---	2.19 86%	1.68 42%	1.57 33%	1.98 68%	1.56 32%	1.52 29%
	Veg	Avg./Meal % Over Issue	0.94 ---	1.14 22%	1.27 36%	1.01 8%	1.02 9%	1.22 30%	0.99 6%
	Dessert	Avg./Meal % Over Issue	2.37 ---	5.02 111%	3.59 51%	3.18 34%	3.41 44%	2.86 21%	2.75 16%
	Bev	Avg./Meal % Over Issue	3.54 ---	9.49 168%	6.58 86%	4.98 41%	9.49 168%	6.58 86%	4.98 41%
	Cond	Avg./Meal % Over Issue	2.47 ---	5.43 120%	3.77 53%	3.4 38%	3.42 39%	2.96 20%	2.84 15%

The average rates in Figure 3 are the simple average of the breakfast and lunch/dinner menu excess fill rates listed in Table 8. For example, the 140% excess fill rate for the 16 meal entrée component is the average of the 121% and 159% breakfast and lunch/dinner menu entrée component excess fill rates. The rates in Figure 3 are also relative to the average portions per meal component in the 50 meal modules. That is, the excess fill rate for the 16 meal entrée component translates to, on average, sufficient entrée meal component servings for 22.4 (16 x 140%) extra meals, on top of the required entrée portions for the target 16 meals. In comparison, for the 16 meal alternative with item subunits, the excess average entrée fill rate is only 70%, or sufficient entrée portions for 11.2 (16 x 70%) extra meals on top of the required 16 meals of entrée portions. Though this is only one-half of the Option 1 overfill, the extra servings still result in increased total component cost that needs to be spread over the modules designed for a 16 meal count, resulting in a higher average total component cost per meal.

Except for vegetables, Figure 3 shows that the by-component excess fill rates for each 16 meal option are much higher than those for the similar 25 meal module option alternative. In comparing same-option 25 and 33 meal modules, the differences in excess fill rates are smaller. The average entrée excess fill rate of 23% for the 25 meal Option 2 module with item subunits is lower than the 37% for the 33 meal Option 2 entrée component. This difference is significant, as the entrée component alone accounts for almost 50% of total per-meal-component cost for the 50 meal module. Figure 3 also reveals that except for vegetables use of 50 meal module item units of pack and subunits results in large average excess fill rates across most alternatives. The low excess vegetable fill rate is because vegetables are not in breakfast and, except for frozen sweet potatoes, all lunch/dinner vegetable items are provided as three #10 cans, which translates to an exact portion fill for the 16 and 33 meal modules and only a 33% overfill for the 25 meal modules. The 100+% excess fill rate for entrées, starches, and beverages for the 16 meal Option 1 alternative is due to a large proportion of the items being provided as one unit of pack for the 50 meal module. The large drop in excess fill rates between Options 1 and 2 for the entrées indicates a large proportion of the entrée items have two or more subunits per unit of pack. Conversely, the small difference between Options 1 and 2 for beverages indicates very few beverage item units of pack have two or more subunits of pack.

#### 2.2.4 Average Total and per-Meal Costs of Alternative Modules

Figure 4 compares the average per-meal costs by all meal components for the 50 meal module and for each smaller module. Those average costs are broken down by breakfast and lunch/dinner menu modules in Table 9, which also lists the average cost increases caused by excess fill. The costs for each item of each of the 23 total menus for the entrée, starch, and dessert meal components and for each of the breakfast accessory items are presented in Appendix B.

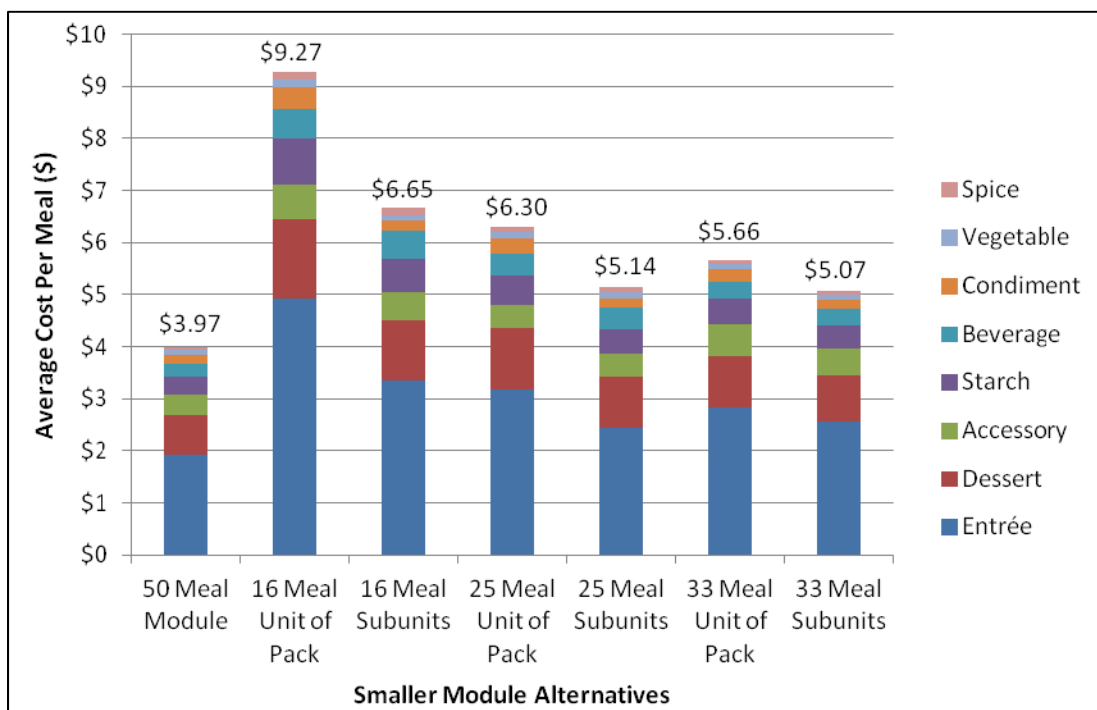


Figure 4. Average per-Meal Costs for Baseline and Alternative Modules by Each Meal Component

**Table 9. Average Cost per Module and Average Increase for Each Alternative by Meal Component**

Menu	Meal Comp	Cost Factor	50 Meal Module	Cost per Smaller Meal Module Alternative					
				Current Item Unit of Pack			With Unit of Pack Subunits		
				16 Meal	25 Meal	33 Meal	16 Meal	25 Meal	33 Meal
Breakfast	Entrée	Avg./Meal % Increase	\$1.69 ---	\$4.02 137.5%	\$2.65 56.3%	\$2.51 48.3%	\$2.79 64.9%	\$2.01 18.8%	\$2.33 37.5%
	Starch	Avg./Meal % Increase	\$0.39 ---	\$1.13 193%	\$0.72 88%	\$0.58 52%	\$0.79 105%	\$0.58 50%	\$0.52 34%
	Dessert	Avg./Meal % Increase	\$0.46 ---	\$0.75 65%	\$0.67 46%	\$0.57 25%	\$0.69 50%	\$0.64 39%	\$0.54 19%
	Bev	Avg./Meal Increase	\$0.31 ---	\$0.53 69%	\$0.45 45%	\$0.36 17%	\$0.48 54%	\$0.44 42%	\$0.37 19%
	Cond	Avg. /Meal Avg./Meal	\$0.18 ---	\$0.50 171%	\$0.32 74%	\$0.27 47%	\$0.21 17%	\$0.19 5%	\$0.19 3%
	Spice	Avg./Meal % Increase	\$0.05 ---	\$0.16 213%	\$0.10 100%	\$0.08 52%	\$0.16 213%	\$0.10 100%	\$0.08 52%
	Access	Avg./Meal % Increase	\$0.42 ---	\$0.66 57%	\$0.45 7%	\$0.62 46%	\$0.56 32%	\$0.45 7%	\$0.52 24%
	<b>Total</b>	<b>Avg./Meal % Increase</b>	<b>\$3.50 ---</b>	<b>\$7.75 121%</b>	<b>\$5.36 53%</b>	<b>\$4.99 42%</b>	<b>\$5.68 62%</b>	<b>\$4.41 26%</b>	<b>\$4.55 30%</b>
Lunch/ Dinner	Entrée	Avg./Meal % Increase	\$2.16 ---	\$5.81 169%	\$3.72 72%	\$3.15 46%	\$3.88 80%	\$2.88 33%	\$2.78 29%
	Starch	Avg./Meal % Increase	\$0.27 ---	\$0.62 128%	\$0.43 59%	\$0.38 41%	\$0.46 70%	\$0.35 29%	\$0.35 30%
	Veg	Avg./Meal % Increase	\$0.19 ---	\$0.28 52%	\$0.27 47%	\$0.21 14%	\$0.21 11%	\$0.24 29%	\$0.20 8%
	Dessert	Avg./Meal % Increase	\$1.03 ---	\$2.33 127%	\$1.65 60%	\$1.42 38%	\$1.63 59%	\$1.31 27%	\$1.25 21%
	Bev	Avg./Meal % Increase	\$0.21 ---	\$0.59 185%	\$0.39 91%	\$0.30 45%	\$0.59 185%	\$0.39 91%	\$0.30 45%
	Cond	Avg./Meal	\$0.15	\$0.38	\$0.25	\$0.21	\$0.18	\$0.17	\$0.16
		% Increase	---	160%	74%	44%	24%	15%	12%
	Spice	Avg./Meal % Increase	\$0.04 ---	\$0.12 205%	\$0.08 95%	\$0.06 52%	\$0.12 205%	\$0.08 95%	\$0.06 52%
	Access	Avg./Meal % Increase	\$0.41 ---	\$0.66 62%	\$0.45 11%	\$0.60 46%	\$0.56 37%	\$0.45 11%	\$0.50 23%
	<b>Total</b>	<b>Avg./Meal % Increase</b>	<b>\$4.46 ---</b>	<b>\$10.79 142%</b>	<b>\$7.24 62%</b>	<b>\$6.33 42%</b>	<b>\$7.63 71%</b>	<b>\$5.87 32%</b>	<b>\$5.60 26%</b>

Note: Breakfast menus contain no vegetables.

As shown in Figure 4, due to the cost impact associated with excess portions, the average per-meal cost for the smaller modules is higher than the \$3.97 for the 50 meal module, ranging from a

maximum of \$9.27 for the 16 meal Option 1 unit of pack alternative to a low of \$5.07 for the 33 meal Option 2 subunit module. The large variation in increased average component per-meal costs is directly associated with the large variation in by-meal-component excess item portions as a function of module size and item level of pack option. Figure 1 shows that, the entrée component accounts for about 48.5% of total cost of the current 50 meal module, and Figure 3 shows that the build of the smaller modules with current entrée items resulted in a large overfill of required entrée portions, especially for the 16 meal modules. For the current 50 meal module menus, the simple average entrée component cost is \$1.93 per meal. In comparison, the average entrée component costs per meal are significantly higher at \$3.34, \$2.45, and \$2.56 per meal for the 16, 25, and 33 meal Option 2 modules, respectively, assembled with item unit of pack subunits and even higher at \$4.92, \$3.19, and \$2.83 for the corresponding Option 1 modules assembled with current 50 meal module item units of pack. With the very large 140% excess entrée portions for the 16 meal module item Option 1 alternative, the average entrée component cost alone for this module at \$4.92 exceeds the total average component cost at \$3.97 per meal for the 50 meal module.

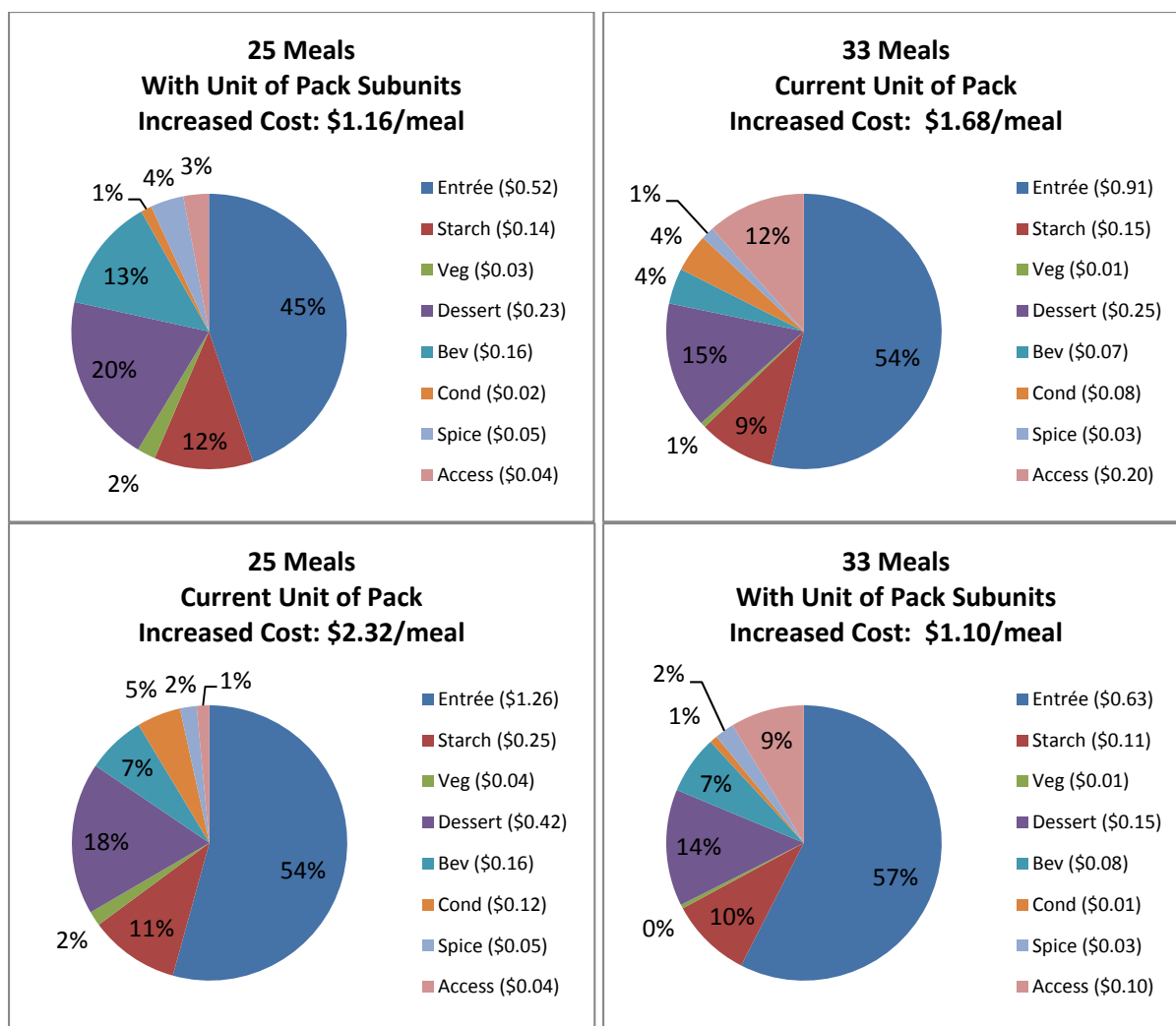
As shown in Figure 3, the Option 2 alternative assembled with item unit of pack subunits greatly reduced the average excess portion fill as compared to the Option 1 alternative. These savings, which are based on the data in Table 9, are listed in Table 10. For both options of item pack, the average total component cost per meal decreases as module meal size increases from 16 to 25 to 33; and for each module size the Option 2 use of item subunits results in a lower average component cost per meal. The use of item subunits generated average total component cost savings of \$2.62, \$1.16, and \$0.59 per meal for the 16, 25, and 33 meal module sizes respectively. At the per-module level, this equates to a total component cost savings of \$41.92, \$29.00, and \$19.47 per 16, 25, and 33 meal modules, respectively.

**Table 10. Comparison of Costs of Unit of Pack and Subunit Packaging Options by Alternative Module**

Cost/Savings	Module Size		
	16	25	33
Average Cost per Meal			
With Current Item Unit of Pack (Option 1)	\$9.27	\$6.30	\$5.66
With Item Unit of Pack Subunits (Option 2)	\$6.66	\$5.14	\$5.08
<b>Savings per Meal Using Option 2</b>	<b>\$2.62</b>	<b>\$1.16</b>	<b>\$0.59</b>
<b>Savings per Module Using Option 2</b>	<b>\$41.92</b>	<b>\$29.00</b>	<b>\$19.47</b>

Figure 5 provides a more detailed breakout of the increased average component cost per meal by meal component than provided in Figure 4 for the 25 and 33 meal Option 1 and 2 module alternatives, which emerged as much more cost beneficial than the 16 meal alternatives. The depicted increased by component costs reflects the average of the extra breakfast and dinner menu by meal component costs from Table 9. For example, the average total component cost per meal for the 25 meal Option 2 module with item subunits (breakfast = \$4.41, dinner = \$5.87) at \$5.14, equals an average increase of \$1.16 per meal, as compared the 50 meal average component cost (breakfast = \$3.50, dinner = \$4.46) of \$3.97. Of the total \$1.16 per meal increase (Figure 5, top left chart), the entrée component accounted for \$0.52 or 45% of the total \$1.16 increase per meal. The \$0.52 extra average cost per

entrée component equals the average of the increase in breakfast menu entrée costs (\$2.01 less \$1.69 or \$0.32) and dinner menu entre costs (\$2.88 less \$2.16 or \$0.72). As depicted across the Figure 5 pie charts, the entrée component accounted for a large 45% to 57% of the extra component cost across the 25 and 33 meal alternatives, while the dessert component accounted for the second largest part ranging from 14% to 20%. Together, the entrée and dessert components alone accounted for between 65% to 72% of the total increase in average component costs per meal for the 25 and 33 meal alternatives.



**Figure 5. Increased Average Per Meal Cost by Meal Component by Smaller Meal Module Alternative**

The Option 2 modules assembled with unit of pack subunits reduced the average extra per meal component costs by 50% for the 25 meal module, compared with Option 1, and reduced them by 35% for the 33 meal alternative. In comparing the extra component costs per meal costs, the increased average per-meal costs are quite similar for the 25 and 33 meal Option 2 alternatives at \$1.16 and \$1.10, respectively. This similarity is primarily due to a lower excess fill of entrée portions for the 25 meal module (23%, Figure 3) as compared to the 33 meal module (37%, Figure 3), and associated resulting smaller extra entrée cost per meal for the 25 meal alternative (\$0.52, Figure 4) as compared to that for the 33 meal alternative (\$0.63, Figure 4).

### 2.3 UGR-A Assembly Workload Impact Generated by Utilizing Unit of Pack Subunits

Though current item packaging for the 50 meal module facilitates breaking many of the items into subunits to more closely provide the required item portions for the smaller size modules and reduce excess item portions and associated extra costs, this activity will generate incremental assembly workloads and associated extra offsetting assembly costs. For some items, the extra workload will be minimal while for others it may be significant. For example, the current unit of pack for NutriGrain bars in the 50 meal module is one case with six inner packages. Thus for the three smaller modules, the case simply needs to be opened and two, three, and four of the inner packages dropped into the 16, 25, and 33 meal modules, respectively. However, in comparison, when the subunits are frozen product bags in a case one or more of the bags will have to be assembled into a smaller box to provide the required product protection during transport and delivery. Based on tradeoffs between item costs, cost savings associated with reducing extra portions, and extra workloads associated with subunits, for some items with subunits, the determination on whether it is more cost effective to utilize item units of pack only or subunits needs be assessed item by item.

For the unit of pack subunits to be cost effective, at each module size, any incremental assembly costs associated with the use of item unit of pack subunits need be less than these per-module Option 2 cost savings amounts listed in Table 10. Three different breakdown actions were identified that create extra work to the assembler: subunit breakdown, count and bag, and boxing. Table 11 provides example items from breakfast and lunch/dinner menus from a variety of different item types. It lists the unit of pack, units per module, subunits per unit, and portions per subunit for each item and indicates whether an operation is associated with any of the three potential workloads for each alternative module. A “1” denotes extra work and a “0” denotes no extra work

Subunit Workload This workload impact is minimal and simply reflects the efforts to break a current item unit of pack to extract the required subunits for each menu module. This assessment was done by-menu, by-item for the three Option 2 meal module alternatives. By menu and alternative, this factor was set to 1 for each item with separate item subunits in the built module, and for all other items it was set to 0. The roll up of this factor by-menu and by-alternative reflected the total number of items with subunits by-menu and by-alternative. For some items with unit of pack subunits, this workload impact reflected the only incremental workload impact associated with the items’ subunits. An example item is NutriGrain bars. This item is packaged as a case containing six retail size boxes of eight bars, which are subpackaged in a box. Based on the decision to maintain current assembly practices and not break retail size packaging, this item’s current unit of pack provides six subunits per unit of pack, and eight portions per subunit. For the Option 2 alternatives, the case was simply opened and two, three, and four of the smaller inner item boxes placed directly into the module boxes for the assembled 16, 25, and 33 Option 2 meal modules respectively. Despite the apparent simplicity, the assembler has to open a case and put a fraction of its contents in another box, instead of merely putting a single case into another box (the standard UGR-A module). This extra work is tallied in the “Subunits” columns in Table 11.



Table 11. Example Extra Work by Module Size - Breakfast and Lunch/Dinner

Item Cat.	Item Description	Unit of Pack	Units/ Modules	Subunits/ Unit	Portions/ Subunits	Extra Work by Module Size								
						16			25			33		
						Sub units	Count & Bag	Box	Sub units	Count & Bag	Box	Sub units	Count & Bag	Box
Ent.	EGG MIX BUTTER FLAVOR	Case	1	2	25	1	0	1	1	0	1	0	0	0
Ent.	TRI TIP STEAK, 5.5 OZ	Case	1	5	10	1	0	1	1	0	1	1	0	1
Ent.	BREAKFAST CHICKEN FILLET	Case	1	1	50	0	0	0	0	0	0	0	0	0
Starch	NUTRIGRAIN BAR	Case	1	6	8	1	0	0	1	0	0	1	0	0
Starch	POTATO PANCAKE	Case	1	3	16 2/3	1	0	1	1	0	1	1	0	1
Dess.	WHOLE GRAIN BROWN SUGAR TOASTER PASTRY	Box	5	1	8	0	0	0	0	0	0	0	0	0
Dess.	WHOLE GRAIN STRAWBERRY TOASTER PASTRY	Box	5	1	8	0	0	0	0	0	0	0	0	0
Bev.	JUICE, 100% ORANGE, CONC, 1 GAL YIELD 3 CNS/MOD	Box	3	1	16 2/3	0	0	0	0	0	0	0	0	0
Cond.	PICANTE/SALSA	Bag*	1	Varies	1	0	0	0	0	0	0	0	0	0
Cond.	CATSUP, JALAPENO	Bag	1	35	1	1	1	0	1	1	0	1	1	0
Acc.	DINING PACKET	Bag	2	25	1	1	1	0	0	0	0	1	1	0
Acc.	TRAY, MESS, 5 COMPARTMENT, NON WHITE	Bag	2	1	25	0	0	0	0	0	0	0	0	0
Ent.	CHINESE BEEF & VEG/GENERAL TSO CHICKEN	Case	1	2	25	1	0	1	1	0	1	0	0	0
Ent.	SAUSAGE SCALOPPINI	Case	1	1	25	0	0	0	0	0	0	0	0	0
Starch	MAPLE GLAZED SWEET POTATOES	Case	1	4	12 1/2	1	0	1	1	0	1	1	0	1
Starch	STUFFING MIX, CORNBREAD	Bag	1	1	50	0	0	0	0	0	0	0	0	0
Veg.	GREEN BEANS	Can	3	1	16 2/3	0	0	0	0	0	0	0	0	0
Dess.	MIXED FRUIT IN CHERRY SYRUP, IND CUP	Case	2	6	4	1	0	0	0	0	0	1	0	0
Dess.	FAMOUS AMOS OATMEAL RAISIN COOKIE	Bag*	1	Varies	1	0	0	0	0	0	0	0	0	0
Bev.	MIXED BERRY ELECTROLYTE DRINK	Bag	1	1	100	0	0	0	0	0	0	0	0	0
Cond.	PEANUT BUTTER & JELLY, GRAPE, TWIN	Bag	1	12	1	1	1	0	1	1	0	1	1	0
Spice	SPICE BLEND, VEG SEASONING	Container	1	1	50	0	0	0	0	0	0	0	0	0
Acc.	DINING PACKET	Bag	2	25	1	1	1	0	0	0	0	1	1	0
Acc.	TRASH BAG, DEGRADABLE	Bag	1	1	4	0	0	0	0	0	0	0	0	0

Breakfast Items

Lunch/Dinner Items

\* Packaged by assembler

Count and Re-bag For some items, after breaking the items' 50 meal module unit of pack, there was a need to count and re-bag the subunit items. This extra workload applied to a subset of items with subunits to include mostly individual portion packaged or count items. Examples include: jalapeno unit of pack – plastic bag with 35 individual portion packages, peanut butter/jelly unit of pack – plastic bag with 12 individual portion packages; and accessory packets – plastic bag with 25 individually packaged packets. There was not a strict rule used for deciding what a counting operation consisted of, but it was added to make a distinction between times when there is an item like Nutrigrain bar that divides into six subunits with eight portions and catsup, jalapeno, which has 35 individual packets. Having to count a separate 35 packets is no small task, and just like for the “Subunits column” a “1” denotes an operation, and a “0” denotes no operation.

Box This assembly workload applied to a small subset of items with packaged subunits to include mostly frozen entrée items for which the item unit of pack, typically a full product case, often had two or more sealed plastic bags of packaged frozen product. For the smaller meal modules, it was assumed that the required number of frozen product bags would need to be repackaged into a smaller box to provide essential protection during transport and distribution. The Box column follows the same line of logic as the count and bag except a box operation only follows the breakdown of a box or case and only when subunits inside do not provide sufficient protection or organization. The maple glazed sweet potatoes, for example, come as a case of four bags. The assumption is that the case protection and structure are not enough without an additional box for packaging.

Each item included as a subunit in an Option 2 menu module generates one of the three below incremental assembly workload impacts:

- Subunit only
- Subunit and count/re-bag
- Subunit and box

The count/re-bag and box workloads are mutually exclusive and will not both occur for the same item. Of the three subunit workload impacts, the required effort to break open current item units of pack into subunits is likely the smallest, the effort to count and re-bag subunits is slightly higher, and the effort to repack items into smaller boxes is likely generating the largest extra workload and cost impact.

For a few items, the unit of pack for the 50 meal module is assembled by the assembler from larger bulk case stocks. Table 11 provides two asterisked examples - individually packaged Picante Sauce and Famous Amos cookies. For the 50 meal modules, the assembler receives these items as bulk cases and counts out and bags the required quantity for the 50 meal module. For each meal module alternatives, the assembler would do the same and count/bag the reduced exact quantity of items required for each smaller module size, resulting in no increase in workload. Thus, even though each alternative UGR-A module for these items will require counting and bagging, there will be no extra work, and each column within the “Extra Work by Module Size” area of Table 11 reflects no extra work. Also in Table 11, for items for which the assembler presently assembles the unit of pack, the entry for the Column “Subunits/Unit” is “Varies” rather than a fixed number because the number varies by meal module size to exactly match required item quantities.

Table 12 compares the Option 2 subunit and workload counts for the three alternative module sizes. With the current 50 meal modules, on average each breakfast and lunch/dinner menu has 23.7 different items. The 16, 25, and 33 meal Option 2 menu modules, on average, included 5.7, 4.6, and 5.0 different items per menu as smaller packaged subunits as compared to each item's 50 meal module unit of pack. This equates to 20% to 25% of the module items, with the other 75% to 80% of the items in each menu being still provided as full item units of pack with no extra assembly workload impacts. For each module size, the number of items requiring counting/bagging or boxing are subsets of the total subunit items per module. For example for the 16 meal module on average there were 5.7 total subunit items per meal module and of these 0.4 incur the subunit workload only, 3.9 incur the subunit and count/bag item workloads, and 1.4 incur the subunit and box item workloads.

**Table 12. Comparison of Option 2 Subunits and Average Workloads by Alternative Module**

Average* Subunit Items per Module	Module Size		
	16	25	33
Total subunit Items	5.7	4.6	5.0
Subunit Items Requiring Counting/Rebagging	3.9	2.9	3.9
Subunit Items Requiring Reboxing	1.4	1.4	0.8

\*Simple average of the overall breakfast menu average and the overall lunch/dinner menu average

Based on the average number of total subunit items and items requiring subsequent counting/bagging or boxing per module, the extra assembly workload impacts for the 16 meal module are greater than those for the 25 and 33 meal modules, while the 25 and 33 meal module assembly workload impacts are quite similar. While item subunits for the 16 meal module generated the largest reduction in average per-meal-component cost at \$2.62, the resulting average component cost per meal at \$6.66 is still higher than that of the 25 or 33 meal modules assembled with current item units of pack for the 50 meal module. For the 25 meal module size, the use of item subunits of pack reduced the total module component cost by \$29.00, or more than 50% more than the \$19.47 cost reduction for the larger 33 meal module. With the similar subunit workload impacts for the 25 and 33 meal module sizes, the use of item subunits will result in a larger net per-module cost savings for the 25 meal module as compared to the 33 meal module.

The averages in Table 12 are broken down for each breakfast menu in Table 13 and for each lunch/dinner menu in Table 14. The counts in Table 12 are the simple averages of the overall averages of the 7 breakfast menus and the 16 lunch/dinner menus. Tables 13 and 14 were generated from summing extra work for all items and providing by menu extra work metrics for breakfast and lunch/dinner menus, respectively. At the bottom of each table, the total amount of extra work by type (subunits, count and bag, and boxes) is totaled and averaged, and the percentage of affected items is calculated for each alternative module size (16, 25, and 33).

**Table 13. Extra Work by Module Size and Menu – Breakfast**

Menu	No. Menu Items	Extra Work by Module Size and Breakfast Menu								
		16			25			33		
		Subunits	Count & Bag	Box	Subunits	Count & Bag	Box	Subunits	Count & Bag	Box
B1	24	6	4	2	5	3	2	5	4	1
B2	26	7	5	2	6	4	2	6	5	1
B3	28	7	5	2	6	4	2	6	5	1
B4	24	7	4	2	6	3	2	6	4	1
B5	24	7	6	1	6	5	1	6	6	0
B5	24	7	6	1	6	5	1	6	6	0
B7	26	8	5	3	7	4	3	6	5	1
<b>Total</b>	<b>176.0</b>	<b>49.0</b>	<b>35.0</b>	<b>13.0</b>	<b>42.0</b>	<b>28.0</b>	<b>13.0</b>	<b>41.0</b>	<b>35.0</b>	<b>5.0</b>
<b>Average</b>	<b>25.1</b>	<b>7.0</b>	<b>5.0</b>	<b>1.9</b>	<b>6.0</b>	<b>4.0</b>	<b>1.9</b>	<b>5.9</b>	<b>5.0</b>	<b>0.7</b>
<b>%</b>		<b>27.8%</b>	<b>19.9%</b>	<b>7.4%</b>	<b>23.9%</b>	<b>15.9%</b>	<b>7.4%</b>	<b>23.3%</b>	<b>19.9%</b>	<b>2.8%</b>

**Table 14. Extra Work by Module Size and Menu - Lunch/Dinner**

Menu	No. Menu Items	Extra Work by Module Size and Lunch/Dinner Menu								
		16			25			33		
		Subunits	Count & Bag	Box	Subunits	Count & Bag	Box	Subunits	Count & Bag	Box
L1	22	4	3	1	3	2	1	4	3	1
L2	29	8	5	1	6	4	1	6	5	0
L3	23	3	3	0	2	2	0	3	3	0
L4	24	4	2	2	3	1	2	4	2	2
L5	22	6	4	1	5	3	1	5	4	0
L6	21	5	2	2	3	1	2	5	2	2
L7	24	4	3	1	3	2	1	4	3	1
L8	22	4	3	0	3	2	0	4	3	0
L9	24	4	3	0	2	2	0	4	3	0
L10	20	2	2	0	1	1	0	2	2	0
L11	20	6	3	1	4	2	1	5	3	1
L12	20	3	2	1	2	1	1	3	2	1
L13	22	4	3	0	3	2	0	4	3	0
L14	20	4	2	0	2	1	0	4	2	0
L15	22	5	2	3	4	1	3	4	2	2
L16	20	5	2	2	4	1	2	5	2	2
<b>Total</b>	<b>355.0</b>	<b>71.0</b>	<b>44.0</b>	<b>15.0</b>	<b>50.0</b>	<b>28.0</b>	<b>15.0</b>	<b>66.0</b>	<b>44.0</b>	<b>12.0</b>
<b>Average</b>	<b>22.2</b>	<b>4.4</b>	<b>2.8</b>	<b>0.9</b>	<b>3.1</b>	<b>1.8</b>	<b>0.9</b>	<b>4.1</b>	<b>2.8</b>	<b>0.8</b>
<b>%</b>		<b>20.0%</b>	<b>12.4%</b>	<b>4.2%</b>	<b>14.1%</b>	<b>7.9%</b>	<b>4.2%</b>	<b>18.6%</b>	<b>12.4%</b>	<b>3.4%</b>

Again as mentioned earlier, there are many items that cannot be broken down; these items are single boxes or cases that have no subunits. They come with a certain number of portions, and there is nothing that can be done to reduce excess portions per unit of pack. Examples from Table 11 include breakfast chicken fillet, which is a 50 portion unit that inevitably adds cost and excess portions. On the other hand there are items like green beans which come as units with 16 2/3 portions per unit; in this case the unit of pack is small enough that not having subunits does not generate as many excess portions.

## **2.4 Logistical Impacts of Using Alternative Modules**

In addition to the adverse cost impacts and workload impacts per meal, the resulting excess item portions per smaller meal module generate two adverse logistical impacts: (1) increased theater transportation impacts (e.g. extra truck missions/container loads, etc) to deliver excess items/portions that cannot be effectively assembled into complete meals and thus have to be discarded; and (2) the resulting generation of a significantly larger field feeding solid waste stream requiring increased collection, on-site treatment, and/or increased backhaul transportation workload to dispose. These impacts were not evaluated during this study, but they must be investigated when making decisions regarding use of smaller modules.

### 3.0 Discussion of Results

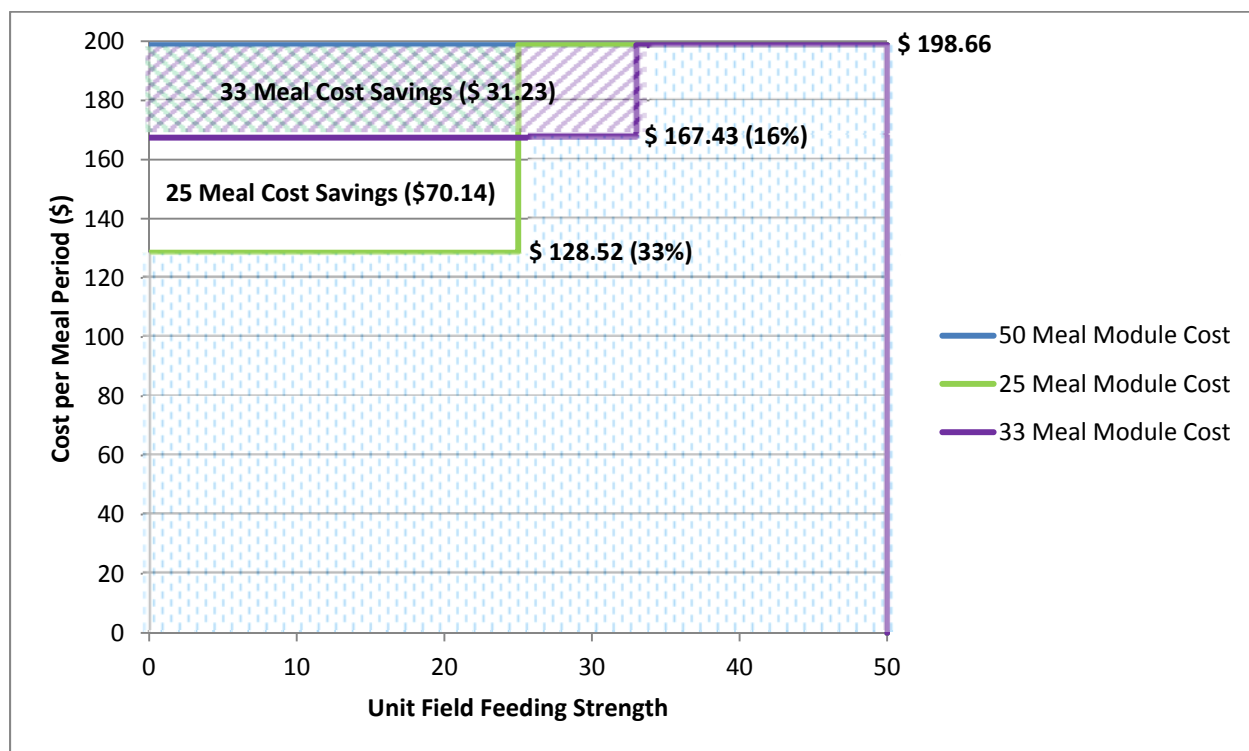
Table 15 summarizes the costs for each of the six alternative modules and the cost savings of each relative to both the 50 meal module cost and the expected savings obtained from the analysis summarized in Section 2.2. The expected savings for each smaller meal module is based on the percent reduction in meals as compared to the 50 meal module with the assumption of exact fill or no extra portions for each item. For example the 16 meal module has 67% fewer meals than the 50 meal module, and therefore the expected component cost savings was 67% of the \$198.66 component cost for the 50 meal module, or \$132.44. However due to extra portions for many items across the six smaller module alternatives, the actual cost savings were much lower and by alternative were between 18% and 71% of the expected savings with no excess portions. For example, for the 25 meal Option 1 alternative, the expected component savings were \$99.33, or 50% of the 50 meal module cost. Due to the impact of excess portions for many items, the achieved component cost savings was only \$41.16, which equates to just 21% of the 50 meal module component cost and 41% of the expected \$99.33 cost savings for a 25 meal module with no extra portions. These cost savings will be further reduced by the extra workload and logistical costs resulting from division of the items unit of packs into subunits discussed in Sections 2.3 and 2.4, respectively. Although the monetary costs of neither of these impacts were determined in this study, the instances and type of extra work caused by subpackaging for each alternative module were tabulated, and the data are presented and discussed in Section 2.3.

**Table 15. Total Component Cost Savings by Smaller Module Alternative**

Component Packaging Level	Cost Factor	Meal Module Size			
		50 Meal	16 Meal	25 Meal	33 Meal
Expected Savings (No Excess Portions)	Component Savings % Savings		\$132.44 67%	\$99.33 50%	\$66.22 33%
50 Meal Module Unit of Pack (Option 1)	Component Cost	\$198.66	\$148.32	\$157.50	\$186.78
	Component Savings	---	\$50.34	\$41.16	\$11.88
	% Actual Savings	---	25	21	6
	% of Expected Savings	---	38	41	18
50 Meal Module Unit of Pack Subunits (Option 2)	Component Cost	\$198.66	\$106.48	\$128.50	\$167.48
	Component Savings	---	\$92.18	\$70.16	\$31.18
	% Actual Savings	---	46	35	16
	% of Expected Savings	---	70	71	47

Based on the cost increases calculated in Section 2.2.4 and the estimated adverse workload impacts summarized in Section 2.3, only two of the six alternatives can be considered potentially viable alternatives to the current 50 meal module for small group UGR-A feeding missions supporting up to 50 Warfighters. Figure 6 graphically depicts the potential average per-meal-period cost savings using the 25 and 33 meal modules listed in Table 15. As previously mentioned, this savings reflects only the average reduction in total module component costs discussed in Section 2.2.4, not the extra assembly and logistical costs associated that will further reduce the cost savings. The 33 meal module results in a

component cost savings of \$31.23 per meal period for site feeding strengths of 33 or less, and nothing for feeding strengths of 34+. The 25 meal module will provide a larger cost savings of \$70.14 for sites with feeding strengths of 25 or less, and nothing for site feeding strengths of 26 or higher.



**Figure 6. Cost Savings per Meal Period for 25 and 33 Meal Modules Assembled with Item Subunits**

The determination of an optimal smaller than 50 meal module size (to complement the current 50 meal modules) for maximum Service benefits is dependent on the number and distribution of below-company-size VSO Team type feeding missions, i.e., in this case, the proportion of the number of VSO Teams with strengths of 25 or less relative to the total number of VSO Teams with strengths of 33 or less. For example, if 100% of the small VSO Teams with strengths of 33 or less all have actual team strengths of between 26 and 33, then the 33 meal module is the clear winner as it can be utilized by 100% of the teams, while the 25 meal module is not a viable alternative for any of the teams. However, if 100% of the VSO Teams that have strengths of 33 or less also have 25 or less, then the 25 meal module provides maximum Service level benefit as it results in a cost savings for a small team per-meal period of \$70.14 instead of a much lower \$31.25 with the 33 meal module.

Based on data provided relative to the range of VSO Team strengths, some will be 25 or smaller while others will be in the 26 to 33 range. Based on this, the minimum required proportion (P) of team strengths that are 33 or less that need also be 25 or less for the 25 meal module to provide the maximum Service level benefit can be calculated as follows.

$P \times \$70.14$  (25 meal module savings) =  $1 \times \$31.25$  (33 meal module savings), or

$P = \$31.25/\$70.14$

$P = 0.45$

Using this calculation, the \$31.25 cost savings would be achieved by 100% of the small teams with feeding strengths of 33 or less, while P represents the proportion of all teams of size 33 or less that are also 25 or less and for which the 25 meal module would also be a viable option. In addition, if 45% or more of the VSO Teams with a team strength of 33 or less also have team strengths of 25 or less, the 25 meal module provides maximum Service level savings benefits. If less than 45% of these teams have team strengths of 25 or less, the 33 meal module provides maximum Service level savings.

However, based on the limited data on the distribution of actual Afghanistan VSO Team strengths, at this time there is no capability to assess the proportion of VSO Team strengths that are 33 or less that are also 25 or less.

Prior to making any decision relative to the overall merits/benefits of any smaller meal module, several factors other than those directly assessed by this analysis need also be effectively addressed and considered. Some of these other factors include:

- Is the Afghan VSO Team identified need for a smaller meal module to support below-company-size field kitchen operations unique to the ongoing deployment or an enduring future mission requirement?
- If the requirement is enduring, what is the expected magnitude (% of total theater strength) and distribution of expected supported feeding strengths for below-company-size field kitchen operations across future potential missions?
- Do the Army and USMC plan to revise their current field feeding doctrine and operational concept presently organized solely for company and battalion level field kitchen capability with no below-company-size field kitchen operations?
- Will scheduled unit field training exercises include sufficient below-company-size UGR-A field kitchen operations to generate required minimum demands to sustain a less than 50 meal UGR-A meal module production contract; and the overall deployment supply chain impacts associated with adding and supporting an additional separate UGR?.

Prior to making any recommendations relative to the need for and overall merits and benefits of a smaller UGR-A meal module, to include the optimal best size if the need is confirmed, the Services need to address and provide clearer insight to these and other factors.



## 4.0 Conclusions and Recommendations

Six smaller alternatives to the current 50 meal UGR-A module configuration were built and assessed for their potential viability as alternatives to the 50 meal module for use in below-company-size small VSO Team field feeding operations. The alternatives represented three meal sizes (16, 25, and 50) and two packaging options: (1) current item units of pack only and (2) units of pack with subunits.

The assessment of each smaller UGR-A meal module size was limited to actual UGR-A assembler 50 meal module item units of pack and subunits due to the unavailability of item cost data for alternative item source vendors or units of pack and the likely assembly objective to also utilize the same 50 meal module items for any smaller meal alternative given the likely much smaller total field training exercise and deployment demand for any smaller meal module.

Each alternative resulted in a lower total module component cost, but a higher average per-meal-component cost due to excess portions for many items. As shown in Table 15, all six alternatives provide some cost savings benefit per meal period, with the Option 2 subunit alternative providing larger savings than the Option 1 unit of pack alternative for the same size module. However, these savings would be reduced by significant workload costs to repackage food items and significant adverse supply chain and logistical support impacts associated with the distribution and management of a second separate UGR-A group ration.

Given the high incremental per-meal cost impacts and the small proportion of VSO Teams with expected strengths of 16 or less and the higher costs of Option 1 packaging, only the 25- and 33-meal Option 2 modules could be suitable alternatives. Furthermore, unless the Services can provide more specifics/details relative to the other decision factors discussed in Chapter 3, there is no analytical basis to assess the overall relative merits and Service level benefits of either of those two alternatives to support the down selection of a recommended “best” smaller meal module, if any.

While the analytical determination of the “optimal” smaller meal module size for post-Afghanistan deployments requires Service-level insight to the expected magnitude (% of total theater strength) and distribution of expected below-company-size field kitchen feeding strengths, the development of essential data are very difficult to perhaps impossible with any level of confidence. Complicating factors include that the Services are doctrinally organized to operate and support company and battalion level field kitchen operations only. As a result, any future post-Afghanistan below-company-size field kitchen requirements will likely be highly deployment and mission specific and can only be assessed once the specifics of each potential deployment and mission are more clearly defined.

For small VSO Team type field feeding missions with the current 50 meal module, the packaging of the entrée component for many menus is the primary cause of the resulting large discard of all meal components across all menus. For several menus, the frozen entrée meal component presently consists of a single item provided as one bulk unit of pack with 50 portions and no packaged subunit to facilitate safely breaking the 50 total portions into two or more subunits with 25 or fewer portions. For these menus, with no safe capability to break or separate out and thaw/cook fewer than 50 entrée portions, the result is the effective need to expend all 50 entrée portions, serve, or discard even if the planned

feeding strength is only 15 to 20. This in turn translates to the effective need to expend all components for 50 complete meals, as all other associated meal components become excess even if not opened, as without an essential entrée component they cannot be assembled to provide a complete meal.

An alternative solution to greatly reduce the quantity of discarded meals/components with the current 50 meal modules for VSO Team type feeding missions is a modification to the current DLA Troop Support 50 meal UGR-A assembly contract specifications. The proposed modification would provide similar and likely larger Service-level benefits relative to reduced meal or component discards as separate fielding of a smaller UGR-A meal module. The modification would simply require that for each menu, each 50 meal module include a minimum of two entrée item subunits of pack (e.g., one unit of pack with two subunits or two units of pack with one subunit) per meal module. This requirement would apply at the entrée meal component level, and not at the entrée item level. For example, a split lunch/dinner menu with two entrées, each with one unit of pack with one subunit, would meet this specification. A similar component level specification requirement would likely apply, e.g., for desserts, if the menu included just one single frozen dessert item per meal. All key frozen menu components could be divided into a minimum of two or more subunits of 25 or fewer servings, resulting in an improved capability to pull, thaw, and prepare the number of portions needed to more closely match required portions based on expected feeding strengths. This simple contract modification translates to a significant reduction in the expended/discarded excess entrées and other meal component portions per meal for below-company-size field kitchen operations.

While providing clear benefit for small below-company-size VSO Team type feeding missions, the aforementioned UGR-A contract modification would also significantly reduce the discard of key meal components and associated complete meals for many smaller company size field kitchens, depending on each kitchen's actual supported feeding strengths, e.g., a field artillery battery (company) kitchen supporting 115. For this unit kitchen and a menu for which the entrée is provided as one unit of pack with 50 portions and no packaged subunits, the current meal results in the expenditure of 150 complete meals per meal period, which is an effective discard of 35 complete meals per meal period. However, with the contract modification and two entrée item subunits of pack per 50 meal module, 25 entrée portions can be kept frozen for a later meal period, and only 125 thawed/prepared, resulting in the reduced expenditure of 125 entrée portions per meal period and a 72% reduction in discarded meals, from 35 to 10.

In addition to generating benefits in reduced excess meal/component discards across all field kitchens to especially include smaller battery and company level kitchens, the benefit of reduced meal discards would be obtained with a single UGR-A group ration and would avoid any of the adverse supply chain and logistical support issues and impacts associated with the distribution and management of a second separate UGR-A group ration.

Therefore, it is recommended that the Services not pursue any smaller UGR-A module at this time. Instead it is recommended that DLA Troop Support explore potential UGR-A contract modifications focused on a minimum of two entrée component item units of pack or subunits, and for other meal components by specific menu as appropriate. As any below-company-size VSO Team type feeding

requirement will very likely constitute a small segment of any deployment force structure, the proposed simple modifications to the current 50 meal UGR-A module assembly contracts will very likely generate greater Service level benefits than the addition of any smaller meal module configuration.

This document reports research undertaken at the U.S. Army Natick Soldier Research, Development and Engineering Center, Natick, MA, and has been assigned No. NATICK/TR- 13/022 in a series of reports approved for publication.

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## **Appendix A:**

### **UGR-A 50 Meal Module Item Packaging Data and Cost Quintiles by Meal Component**

Tables A-1 and A-2 list all meal items and their unit of pack and subunit quantities, item portions/counts, and cost quintiles from one of the UGR-A assemblers for the baseline 50 meal Unitized Group Ration-A (UGR-A) menu modules. Table A-1 provides the data for the seven breakfast menus, and Table A-2 provides the data for the 16 lunch/dinner menus. Several items are common to both breakfast and lunch/dinner menus and are therefore included in both Tables A1 and A2. Examples include all accessory items such as mess trays, cups, utensil packs, trash bags, and gloves; and select spice, condiment, and beverage category items. In both tables, the items are sorted and presented first by meal component, then by item cost quintile rating, and finally alphabetically by item name.

*Meal Component* One of eight item categories that tables are sorted by:: entrée, starch, vegetable, dessert, beverage, condiment, spice, and accessory.

*Unit of Pack* An item's current level of pack as placed in the boxes for the 50 meal modules. Units of pack include case, box, bag, can, tray, bottle, and container. "Case" indicates the item is presently loaded by the assembler into the 50 meal module box exactly as received from the source vendor, while the others reflect a subunit of a case to include potentially some assembler item level pre-assembly (e.g. bags of items) to obtain the item unit of pack as loaded into the current module.

*Subunits* The number of packaged units within the item's current unit of pack that can be potentially removed, without breaking down the commercial packaging, and used in the smaller meal modules to better match each item's provided and required item portions and minimize any excess item portions. An item with a subunit value of 1 indicates the current item unit of pack cannot be broken down into smaller, appropriately packaged subunits. All items that have a unit of pack of can, tray, box, bottle, and container also have just one subunit indicating no potential to subdivide for smaller size meal modules.

*Portions/Subunits* This indicates the number of portions provided per subunit for food items and item count for non-food items (trays, cups, etc). The associated number of portions per unit of pack can be obtained by multiplying the items' listed subunits by the portions per subunit.

*Item Cost Quintile* Ratings assigned to menu items to provide insight to each item's total relative cost across each set of menus, as a substitute for the unreleasable proprietary actual costs. The ratings ranged from 5 for the 20% of items with the highest total cost across all menus to 1 for the 20% of items with the lowest total item cost across all menus

The item portions per current unit of pack and fill rate (i.e. servings or count per meal) needed to build and evaluate alternative size are not detailed in Tables A-1 and A-2, but can be readily derived from the item data. Each item's number of portions per current unit of pack is obtained by multiplying the item's listed subunits by the portions per subunit. Similarly, by menu, an item's current module fill rate (per meal) is calculated by multiplying the item unit of pack quantity by subunits, multiplying that by portions per subunit, and then dividing by 50. The by-item fill rate is key, as it determines the required minimum number of portions for each item for the smaller meal module alternatives.

Table A-1: Breakfast Item Packaging Data and Cost Quintile by Meal Component

Meal Component	Item Description	Unit of Pack	Subunits	Portions/ Subunit	Item Unit of Pack Quantity by Menu								Cost Quintile
					B1	B2	B3	B4	B5	B6	B7	Total	
Ent.	BEEF BREAKFAST SKILLET	Case	2	25	0	0	0	0	0	0	1	1	5
Ent.	BREAKFAST CHICKEN FILLET	Case	1	50	0	1	0	0	0	0	0	1	5
Ent.	CHIPOTLE BACON	Case	1	50	0	0	0	0	1	0	0	1	5
Ent.	EGG MIX BUTTER FLAVOR	Case	2	25	1	1	1	1	1	1	1	7	5
Ent.	RANCHERO BEEF STEAK	Case	4	12 1/2	1	0	0	0	0	0	0	1	5
Ent.	SHELF STABLE BACON	Case	1	50	0	0	1	0	0	1	0	2	5
Ent.	TRI TIP STEAK, 5.5 OZ	Case	5	10	0	0	1	0	0	0	0	1	5
Ent.	BEEF SAUSAGE & EGG QUESADILLA	Case	1	36	1	0	0	0	0	0	0	1	4
Ent.	BONELESS HAM STEAK	Case	1	36	0	1	0	0	0	0	0	1	4
Ent.	CHORIZO AND EGG WRAP	Case	1	36	0	0	0	0	0	1	0	1	4
Ent.	CINNAMON GLAZED FRENCH TOAST	Box	1	50	0	0	0	0	0	1	0	1	4
Ent.	PANCAKE & SAUSAGE ON A STICK	Case	1	50	0	0	0	0	1	0	0	1	4
Ent.	SAUSAGE, LINK, PRECKD, W/CASING 1.6 OZ	Case	1	50	0	0	0	0	0	0	1	1	4
Ent.	BREAKFAST CHEDDAR SAUCE	Case	1	50	0	1	0	0	0	0	0	1	3
Ent.	CHEDDAR SAUSAGE GRAVY	Case	1	25	0	0	0	1	0	0	0	1	3
Ent.	FRENCH TOAST/SAUSAGE TAQUITO	Case	1	24	0	0	1	0	0	0	0	1	3
Ent.	RANCHERO BEEF TAQUITO	Case	1	24	0	0	0	1	0	0	0	1	3
Ent.	VEG, PEPPERS AND ONIONS, FRZN.	Bag	1	20	0	0	2	0	0	0	0	2	2
Starch	APPLE FILLED BAGEL	Case	1	48	0	0	0	0	0	0	1	1	5
Starch	BUTTERMILK BISCUIT, FROZEN, TFF	Case	5	10	0	1	0	1	0	0	0	2	5
Starch	HASHBROWNS	Case	1	50	0	1	1	0	1	1	0	4	4
Starch	NUTRIGRAIN BAR	Case	6	8	0	0	0	1	0	0	0	1	4
Starch	WHOLE GRAIN MUFFIN	Tray	1	24	0	0	0	0	0	2	0	2	3
Starch	APPLE CINNAMON OATMEAL	Box	1	18	0	0	1	0	0	0	1	2	2
Starch	GOLDEN MAPLE OATMEAL	Box	1	18	1	0	0	0	0	1	0	2	2
Starch	HOMINY GRITS, INSTANT	Box	1	25	2	0	0	2	0	0	2	6	2
Starch	POTATO PANCAKE	Case	3	16 2/3	0	0	0	0	0	0	1	1	2
Dess.	CARAMEL APPLE COFFEE CAKE	Tray	1	17	0	0	0	3	0	0	0	3	5
Dess.	SHELF STABLE BLUEBERRY MUFFIN	Tray	1	15	0	3	0	0	0	0	0	3	5
Dess.	CINNAMON ROLL W/ ICING	Tray	1	15	3	0	0	0	0	0	0	3	4
Dess.	FRENCH TOAST COOKIE	Bag*	1	50	0	0	0	0	0	1	0	1	4
Dess.	DONUT, POWDER SUGAR	Case	1	48	0	0	0	0	1	0	0	1	3
Dess.	FROSTED BLUEBERRY TOASTER PASTRY	Case*	5	8	1	0	0	0	0	0	0	1	3

**Table A-1: Breakfast Item Packaging Data and Cost Quintile by Meal Component**

Meal Component	Item Description	Unit of Pack	Subunits	Portions/ Subunit	Item Unit of Pack Quantity by Menu								Cost Quintile
					B1	B2	B3	B4	B5	B6	B7	Total	
Dess.	MINI DANISH	Tray	1	24	0	0	2	0	0	0	0	2	3
Dess.	WHOLE GRAIN BROWN SUGAR TOASTER PASTRY	Box	1	8	0	0	0	0	5	0	0	5	3
Dess.	WHOLE GRAIN STRAWBERRY TOASTER PASTRY	Box	1	8	0	0	0	0	0	0	5	5	3
Bev.	JUICE, 100% ORANGE, CONC, 1 GAL YIELD 3 CNS/MOD	Box	1	16 2/3	3	0	3	0	3	0	0	9	5
Bev.	GRAPE JUICE	Box	1	7 1/7	0	0	0	7	0	0	7	14	4
Bev.	APPLE JUICE	Box	1	16 2/3	0	3	0	0	0	0	0	3	3
Bev.	TROPICAL JUICE	Box	1	7 1/7	0	0	0	0	0	7	0	7	3
Bev.	CAPPUCCINO, FRENCH VANILLA	Bag	20	1	1	0	0	0	0	1	0	2	2
Bev.	COFFEE, ROASTED, FILTER PACK	Bag	1	50	1	1	1	1	1	1	1	7	2
Bev.	APPLE MORNING SPARK	Box	1	30	0	0	0	0	0	0	1	1	1
Bev.	CAPPUCCINO, IRISH CRÈME	Bag	20	1	0	0	1	0	0	0	0	1	1
Bev.	COCOA BEV POWDER, SWT, NONFORTIFIED, 1 OZ PACKAGE	Bag	10	1	0	1	0	1	1	0	1	4	1
Bev.	CRANBERRY MORNING SPARK	Box	1	30	0	1	0	0	0	0	0	1	1
Cond.	ALL PURPOSE SAUCE	Bag*	50	1	0	0	1	0	0	0	0	1	3
Cond.	HONEY 40 g PACKETS	Bag	50	1	0	1	0	0	0	0	0	1	3
Cond.	MAPLE SYRUP	Bag	50	1	0	0	1	0	2	2	2	7	3
Cond.	18 G KETCHUP	Bag*	50	1	1	1	1	1	0	1	1	6	2
Cond.	HOT SAUCE .75 OZ BOTTLE	Bottle	1	12 1/2	0	4	4	4	4	4	0	20	2
Cond.	CATSUP, JALAPENO	Bag	35	1	0	0	0	0	1	0	0	1	1
Cond.	CHILE LIME HOT SAUCE	Bottle	1	50	1	0	0	0	0	0	1	2	1
Cond.	CREAMER, NON-DAIRY, POWDER	Bag	12	1	1	1	1	1	1	1	1	7	1
Cond.	GRAPE JELLY, PORTION CONTROLLED	Bag	25	1	1	0	1	1	0	1	0	4	1
Cond.	PICANTE/SALSA	Bag*	50	1	1	0	0	0	1	0	0	2	1
Cond.	STRAWBERRY JAM, PORTION CONTROLLED	Bag	25	1	0	1	0	0	1	0	1	3	1
Spice	BUTTER GRANULES	Bag	1	50	1	1	1	1	0	1	1	6	2
Spice	OIL, BUTTER FLAVOR	Bottle	1	50	1	1	1	1	1	1	1	7	2
Spice	SPICE BLEND, MINCED ONION	Container	1	50	0	1	1	1	1	1	0	5	1
Spice	SPICE BLEND, STEAK SEASONING	Container	1	50	0	0	1	0	0	0	0	1	1
Spice	SPICE, BLACK PEPPER	Container	1	50	1	1	1	1	1	1	1	7	1
Spice	SPICE, IODIZED TABLE SALT	Container	1	50	1	1	1	1	1	1	1	7	1
Acc.	DINING PACKET	Bag	25	1	2	2	2	2	2	2	2	14	5

**Table A-1: Breakfast Item Packaging Data and Cost Quintile by Meal Component**

Meal Component	Item Description	Unit of Pack	Subunits	Portions/ Subunit	Item Unit of Pack Quantity by Menu								Cost Quintile
					B1	B2	B3	B4	B5	B6	B7	Total	
Acc.	TRAY, MESS, 5 COMPARTMENT, NONWHITE	Bag	1	25	2	2	2	2	2	2	2	14	5
Acc.	CUPS, PAPER, HOT/COLD, 8 OZ NONWHITE, 100 CT	Bag	1	25	4	4	4	4	4	4	4	28	4
Acc.	TRASH BAG DEGRADABLE	Bag	1	4	1	1	1	1	1	1	1	7	2
Acc.	GLOVES	Bag	1	10	1	1	1	1	1	1	1	7	1

\*Item packaged by assembler



Table A-2: Lunch/Dinner Packaging Data and Cost Quintile by Meal Component

Meal Comp	Item Description	Unit of Pack	Subunits	Portions /Subunit	Item Unit of Pack Quantity by Menu																	Cost Quintile
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	Total	
Ent.	BEEF BRISKET	Case	1	12 1/2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5
Ent.	BEEF PATTIES, PRECOOKED	Case	1	33 1/3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
Ent.	BEEF PRIME RIB	Case	1	50	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	5
Ent.	BUFFALO MAC & CHEESE	Case	4	6 1/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5
Ent.	BURGUNDY BEEF RIBS	Case	5	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	5
Ent.	CHICKEN CORDON BLEU	Case	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	5
Ent.	CHICKEN, JERK STYLE	Case	1	25	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	5
Ent.	CHINESE BEEF & VEG/GENERAL TSO CHICKEN	Case	2	25	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	5
Ent.	ENCHILADA KIT	Case	1	50	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	5
Ent.	LOW SODIUM FRIED CHICKEN	Case	1	50	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
Ent.	MINI MEATLOAF IN SAUCE	Case	5	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5
Ent.	NY STRIP STEAK	Case	5	10	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	5
Ent.	PENNE ALFREDO W/BACON	Case	4	6 1/4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	5
Ent.	PORK, RIB SLABS	Case	1	25	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	5
Ent.	SHRIMP SCAMPI WITH PASTA	Case	6	4 1/6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	5
Ent.	TERIYAKI CHICKEN THIGHS / SPICY PORK WINGS	Case	10	5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	5
Ent.	TURKEY CUTLET	Case	5	10	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	5
Ent.	BEEF FRANK	Case	2	8 1/3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
Ent.	PORK, PORK IN BBQ SAUCE	Case	1	25	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
Ent.	SAUSAGE SCALOPPINI	Case	1	25	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	4
Ent.	TOMATILLO PORK/PRESSED FLOUR TORTILLAS	Case	1	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4
Ent.	CHILI WITH BEANS	Case	1	50	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Ent.	MEATBALLS AND SAUCE - 25 CT	Case	1	25	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	3
Ent.	POBLANO CORN CHOWDER	Case	2	12 1/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
Ent.	VEG, PEPPERS & ONIONS, FRZN.	Bag	1	20	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	3
Starch	MAPLE GLAZED SWEET POTATOES	Case	4	12 1/2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	5

Table A-2: Lunch/Dinner Packaging Data and Cost Quintile by Meal Component

Meal Comp	Item Description	Unit of Pack	Subunits	Portions /Subunit	Item Unit of Pack Quantity by Menu																	Cost Quintile
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	Total	
Starch	LOADED MASHED POTATOES	Case	5	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4
Starch	PIZZA ROLL	Case	1	48	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	4
Starch	AU GRATIN POTATO	Box	1	25	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	3
Starch	HERB & BUTTER MASHED POTATOES	Bag	1	16 2/3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	0	6	3
Starch	NATURAL POTATO WEDGE	Bag	1	16 2/3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	3
Starch	POTATO WEDGE	Bag	1	25	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
Starch	PRIMAVERA RICE	Bag	1	25	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	3
Starch	RICE INSTANT 24 OZ BOX	Box	1	16 2/3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	0	6	3
Starch	CORNBREAD JALAPENO	Case	1	24	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Starch	CORNBREAD PLAIN	Case	1	24	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Starch	MACARONI AND CHEESE COMBO	Bag	1	50	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Starch	MEXICAN CHILI BEANS	Can	1	25	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	2
Starch	RICE PILAF	Bag	1	48	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Starch	RICE, MEXICAN	Box	1	25	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	2
Starch	ROASTED GARLIC MASHED POTATOES	Bag	1	16 2/3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	2
Starch	STUFFING MIX, CORNBREAD	Bag	1	50	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Starch	PASTA, SPAGHETTI, DRY, THIN, LONG, BOX	Box	1	8 1/3	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	6	1
Veg.	VEG, CORN, GOLDEN, GRADE A	Can	1	16 2/3	0	0	3	0	3	0	0	3	0	0	0	3	0	0	0	3	15	5
Veg.	COLLARD GREENS	Case	5	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
Veg.	VEG, MIXED, PEAS & CARROTS, GRADE A	Can	1	16 2/3	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	6	4
Veg.	GREEN BEANS	Can	1	16 2/3	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0	6	3
Veg.	ITALIAN GREEN BEANS	Can	1	16 2/3	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	6	3
Veg.	VEG, PEAS, EARLY OR SWEET, GRADE A	Can	1	16 2/3	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3	3
Veg.	BAKED BEANS	Can	1	25	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Veg.	SLICED CARROTS	Can	1	16 2/3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	2

**Table A-2: Lunch/Dinner Packaging Data and Cost Quintile by Meal Component**

Meal Comp	Item Description	Unit of Pack	Subunits	Portions /Subunit	Item Unit of Pack Quantity by Menu																	Cost Quintile
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	Total	
Dess.	APPLE PIE, INDIVIDUAL SLICES	Case	1	48	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	5
Dess.	CHOCOLATE CHUNK COOKIE	Case	2	24	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
Dess.	CHOCOLATE CHUNK MACADAMIA	Case	2	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	5
Dess.	DICED PEARS, IND CUP	Case	12	4	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	3	5
Dess.	LITE MIXED FRUIT, IND CUP	Case	6	4	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	4	5
Dess.	PEACHES IN STRAWBERRY-BANANA SYRUP, IND CUP	Case	6	4	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	5
Dess.	SWEET POTATO PIE	Case	1	48	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	5
Dess.	AMARETTO CREAM CAKE	Tray	1	18	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3	4
Dess.	APPLE CINNAMON TAQUITO	Case	1	24	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4
Dess.	APPLESAUCE, IND CUP	Case	1	6	0	0	8	0	0	0	0	0	0	0	0	8	0	0	0	0	16	4
Dess.	CHEESECAKE, ASSORTED	Case	4	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4
Dess.	CHOCOLATE CAKE W/ CHOCOLATE ICING	Tray	1	18	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	4
Dess.	COOKIE DOUGH W/ CANDY COATED DISKS	Case	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4
Dess.	CUPCAKE, ALMOND	Tray	1	15	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4
Dess.	CUPCAKES, ASSORTED VANILLA & DEVIL'S FOOD	Case	4	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4
Dess.	DULCE DE LECHE CHEESECAKE BITES	Case	6	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4
Dess.	FAMOUS AMOS CHOC CHIP COOKIE	Bag*	50	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2	4
Dess.	FAMOUS AMOS OATMEAL RAISIN COOKIE	Bag*	50	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	4
Dess.	HARVEST PUMPKIN CAKE	Tray	1	17	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	4
Dess.	MIXED FRUIT IN CHERRY SYRUP, IND CUP	Case	6	4	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	4
Dess.	PINEAPPLE COCONUT CAKE	Tray	1	17	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	4
Dess.	TURTLE BROWNIE	Box	1	48	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	4
Dess.	CANDY COATED DISK	Box	1	48	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	3
Dess.	CANDY COATED DISK W PEANUT	Box	1	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3

Table A-2: Lunch/Dinner Packaging Data and Cost Quintile by Meal Component

Meal Comp	Item Description	Unit of Pack	Subunits	Portions /Subunit	Item Unit of Pack Quantity by Menu																	Cost Quintile
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	Total	
Dess.	CHOCOLATE PUDDING CUPS	Box	1	4	12	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	24	3
Dess.	RASPBERRY LEMON CAKE	Tray	1	16	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3	3
Dess.	REESES PIECES	Bag*	25	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
Dess.	RICE KRISPIE TREAT	Box	1	24	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
Dess.	VANILLA PUDDING CUPS	Box	1	4	0	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	24	3
Dess.	BUTTERSCOTCH PUDDING CUPS	Box	1	4	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	12	2
Bev.	COFFEE, ROASTED, FILTER PACK	Bag	1	50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	4
Bev.	PEACH TEA INDIVIDUAL STICKS	Box	1	30	0	1	0	0	0	0	0	1	0	0	0	0	1	0	1	4	4	
Bev.	BEV BASE, ICED TEA, LEMON FLAVOR, SUGAR SWT, 2 GAL YIELD	Bag	1	33 1/3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	0	6	3
Bev.	LEMONADE INDIVIDUAL STICKS	Box	1	30	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3
Bev.	PEACH FLAVORED ICE TEA CANISTER	Canister	1	100	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2	3
Bev.	BEV BASE, GRAPE, SWT, PWDR, 2 GAL YIELD	Bag	1	33 1/3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3	6	2
Bev.	FRUIT PUNCH ELECTROLYTE DRINK	Bag	1	100	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	2
Bev.	FRUIT PUNCH ELECTROLYTE STICKS	Box	1	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2
Bev.	LEMON LIME ELECTROLYTE DRINK	Bag	1	100	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	2
Bev.	LEMON LIME ELECTROLYTE STICKS	Box	1	30	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Bev.	MIXED BERRY ELECTROLYTE DRINK	Bag	1	100	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	2	2
Bev.	ORANGE ELECTROLYTE DRINK	Bag	1	100	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2
Bev.	RASPBERRY ICE INDIVIDUAL STICKS	Box	1	30	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2	2
Bev.	SUGAR FREE BLUEBERRY WHITE TEA STICKS	Box	1	30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2
Bev.	WILD BERRY W/ CALCIUM	Box	1	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Bev.	BEV BASE, LEMONADE, PINK, SWT, PWDR, 2 GAL YIELD	Bag	1	33 1/3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Bev.	BEV BASE, LEMONADE, SWT, PWDR, 2 GAL YIELD	Bag	1	33 1/3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	1
Bev.	SUGAR FREE CRANBERRY POMEGRANATE STICKS	Box	1	20	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1

Table A-2: Lunch/Dinner Packaging Data and Cost Quintile by Meal Component

Meal Comp	Item Description	Unit of Pack	Subunits	Portions /Subunit	Item Unit of Pack Quantity by Menu																	Cost Quintile
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	Total	
Bev.	SUGAR FREE FRUIT PUNCH STICKS	Box	1	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
Cond.	ALL PURPOSE SAUCE	Bag*	50	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	4
Cond.	HOT SAUCE .75 OZ BOTTLE	Bottle	1	12 1/2	4	0	4	4	4	4	0	0	4	0	4	4	4	4	0	4	44	3
Cond.	PEANUT BUTTER & JAM, STRAWBERRY, TWIN	Bag	12	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	3	3
Cond.	PEANUT BUTTER & JELLY, GRAPE, TWIN	Bag	12	1	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	4	3
Cond.	CHILE LIME HOT SAUCE	Bottle	1	50	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	3	2
Cond.	CREAMER, NON-DAIRY, POWDER	Bag	12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	2
Cond.	18 GRAM KETCHUP	Bag*	25	1	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	4	1
Cond.	BBQ DIPPING SAUCE	Bag	35	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1
Cond.	CARAMEL SAUCE	Bottle	1	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1
Cond.	FRUIT, CRANBERRY SAUCE, GRADE A	Can	1	16 2/3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Cond.	GRAVY MIX, INSTANT, BROWN	Bag	1	17	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	3	9	1
Cond.	GRAVY MIX, INSTANT, CHICKEN	Bag	1	17	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	1
Cond.	GRAVY MIX, INSTANT, COUNTRY	Bag	1	17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Cond.	GRAVY MIX, INSTANT, TURKEY	Bag	1	17	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Cond.	HORSERADISH SAUCE	Bag*	50	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Cond.	PARMESAN CHEESE, PORTION CONTROLLED	Bag*	50	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2	1
Cond.	PICANTE/SALSA	Bag*	50	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1
Cond.	SALAD DRESSING, PORTION CONTROLLED	Bag	25	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Cond.	SOY SAUCE, PORTION CONTROLLED	Bag	35	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
Cond.	SWEET RELISH, PORTION CONTROLLED	Bag	25	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Cond.	YELLOW MUSTARD, PORTION CONTROLLED	Bag	25	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Spice	BUTTER GRANULES	Bag	1	50	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	14	3
Spice	SPICE BLEND, VEG SEASONING	Container	1	50	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	14	2
Spice	SPICE, BLACK PEPPER	Container	1	50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	2
Spice	SPICE, IODIZED TABLE SALT	Container	1	50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	2

**Table A-2: Lunch/Dinner Packaging Data and Cost Quintile by Meal Component**

Meal Comp	Item Description	Unit of Pack	Subunits	Portions /Subunit	Item Unit of Pack Quantity by Menu																	Cost Quintile
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	Total	
Spice	OIL, BUTTER FLAVOR	Bottle	1	50	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1
Spice	SPICE BLEND, BARBECUE STYLE	Container	1	50	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Spice	SPICE BLEND, CINNAMON MAPLE SPRINKLES	Container	1	50	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Spice	SPICE BLEND, ITALIAN STYLE	Container	1	50	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
Spice	SPICE BLEND, MINCED ONION	Container	1	50	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Spice	SPICE BLEND, PAPRIKA	Container	1	50	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1
Spice	SPICE BLEND, POULTRY SEASONING	Container	1	25	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Spice	SPICE BLEND, STEAK SEASONING	Container	1	50	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	4	1
Acc.	DINING PACKET	Bag	25	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32	5
Acc.	TRAY, MESS, 5 COMPARTMENT, NONWHITE	Bag	1	25	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32	5
Acc.	CUPS, PAPER, HOT/COLD, 8 OZ NONWHITE, 100 CT	Bag	1	25	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	48	4
Acc.	TRASH BAG, DEGRADABLE	Bag	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	3
Acc.	GLOVES	Bag	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	2

\*Item packaged by assembler

## **Appendix B:**

### **Item Level Packaging Data and Rules for Alternative UGR-A Meal Modules**

As mentioned in Section 2.2.2, subunits can contain one or more portions of food depending on the item. Menu item portion data are separated into tables based on item type (entrée, starch, dessert, or accessory) and meal type (lunch/dinner or breakfast). Breakfast entrée item portions can be found in Table B-1, lunch/dinner entrée item portions in Table B-2, breakfast starch in Table B-3, lunch/dinner starch in Table B-4, breakfast dessert in Table B-5, lunch/dinner dessert in Table B-6, and breakfast accessories in Table B-7. Lunch/dinner accessories tend to be the same across menus (although the portions per alternative menu weren't) and the rest of the item tables were not included because their impact on module cost was extremely small.

Tables B-1 through B-7 also include portions per item for each alternative size and packaging assumption stated in the first paragraph of this appendix. The projected portions per item in each case were generated from a common set of rules and assumptions for the sake of consistency. The first step is to determine the fill rate for each item, which is the number of portions per item per meal for current 50 meal modules. This is simply calculated by dividing an item's total number of portions per menu by 50. For all dessert, vegetable, beverage, condiment, spice, and accessory items this fill rate is maintained for all alternative module builds. So if 50 portions of one of these items are included in a 50 meal module, then at least 16 need to be included in the alternative 16 meal module, 25 in the 25 meal module, and 33 in the 33 meal module. If the rate is half that, then divide the minimum fill rate in half: 8 portions, 12.5 portions, and 16 2/3 portions respectively. For all starch items, the above fill rate rule follows for every item except corn bread and jalapeño corn bread because it was decided they should be treated as two units of the same item because they are so similar. Entrées are treated somewhat differently so their minimum fill requirements were determined by a different fill rate concept. For lunch/dinner entrées the minimum fill rate requirement was determined by adding the total number of entrée portions across all entrée items for a given menu divided by 50 to give the general entrée item fill rate per menu, then filling with the "best" entrée items with two exceptions. The two exceptions are the two asterisked items in Table B-2: VEG, PEPPERS AND ONIONS, FRZN and CHILI WITH BEANS because they are considered add-ons of other meal items and not standalone meals. These asterisked items' portions are not included when calculating the per-menu entrée fill rate either; they are added using the rules for non-entrée items if their complementary component is included in an alternative menu module. The definition of "best" in this case is defined in this order of preference: non-pork or seafood, non-pork, and non-seafood. Any ties are decided by picking whatever is thought to be the more preferred item. The same fill rate method was used for breakfast entrées as well, except instead of just excluding asterisked items, EGG MIX BUTTER FLAVOR and CINNAMON GLAZED FRENCH TOAST were also excluded. These two items use the fill rate rules for non-entrée items. Excluding these items, the total number of entrée item portions per menu was summed and divided by 50 to calculate the general entrée portion fill rate. Then the "best" entrée items are selected again to make minimum portion requirements. Definitions of each metric used in Tables B-1 through B-7 are listed following Table B-7.

Table B-1: UGR-A Item Portions by Item Level of Pack and Module Size (# Meals) – Breakfast Entrée

Menu	Item*	Item Portions		No. Portions 50 Meal Module	Item Portions by Item Level of Pack and Module Size (# Meals)					
		Unit of Pack	Subunits		Current Unit of Pack			With Unit of Pack Subunits		
					16	25	33	16	25	33
B1	EGG MIX BUTTER FLAVOR	50.0	25.0	50.0	50.0	50.0	50.0	25.0	25.0	50.0
B1	RANCHERO BEEF STEAK	50.0	12.5	50.0	50.0	50.0	50.0	25.0	25.0	37.5
B1	BEEF SAUSAGE & EGG QUESADILLA	36.0	36.0	36.0	0.0	0.0	36.0	0.0	36.0	36.0
B2	EGG MIX BUTTER FLAVOR	50.0	25.0	50.0	50.0	50.0	50.0	25.0	25.0	50.0
B2	BREAKFAST CHICKEN FILLET	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B2	BONELESS HAM STEAK	36.0	36.0	36.0	0.0	0.0	36.0	0.0	0.0	36.0
B2	BREAKFAST CHEDDAR SAUCE*	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B3	EGG MIX BUTTER FLAVOR	50.0	25.0	50.0	50.0	50.0	50.0	25.0	25.0	50.0
B3	VEG, PEPPERS AND ONIONS, FRZN.*	20.0	20.0	40.0	20.0	20.0	40.0	20.0	20.0	40.0
B3	SHELF STABLE BACON	50.0	50.0	50.0	0.0	0.0	50.0	0.0	50.0	50.0
B3	TRI TIP STEAK, 5.5 OZ	50.0	10.0	50.0	50.0	50.0	50.0	20.0	30.0	40.0
B3	FRENCH TOAST/SAUSAGE TAQUITO	24.0	24.0	24.0	0.0	24.0	0.0	24.0	0.0	0.0
B4	EGG MIX BUTTER FLAVOR	50.0	25.0	50.0	50.0	50.0	50.0	25.0	25.0	50.0
B4	RANCHERO BEEF TAQUITO	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
B4	CHEDDAR SAUSAGE GRAVY*	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
B5	EGG MIX BUTTER FLAVOR	50.0	25.0	50.0	50.0	50.0	50.0	25.0	25.0	50.0
B5	CHIPOTLE BACON	50.0	50.0	50.0	0.0	0.0	50.0	0.0	0.0	50.0
B5	PANCAKE & SAUSAGE ON A STICK	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B6	EGG MIX BUTTER FLAVOR	50.0	25.0	50.0	50.0	50.0	50.0	25.0	25.0	50.0
B6	CHORIZO AND EGG WRAP	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
B6	SHELF STABLE BACON	50.0	50.0	50.0	0.0	0.0	50.0	0.0	0.0	50.0
B6	CINNAMON GLAZED FRENCH TOAST	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B7	EGG MIX BUTTER FLAVOR	50.0	25.0	50.0	50.0	50.0	50.0	25.0	25.0	50.0
B7	BEEF BREAKFAST SKILLET	50.0	25.0	50.0	50.0	50.0	50.0	50.0	50.0	25.0
B7	SAUSAGE, LINK, PRECKD, W/CASING 1.6 OZ	50.0	50.0	50.0	0.0	0.0	50.0	0.0	0.0	50.0
	Total Portions*			1006.0	710.0	734.0	982.0	504.0	576.0	934.5
	Avg. Portions Per Menu			143.7	101.4	104.9	140.3	72.0	82.3	133.5
	Avg. Portions Per Meal			2.87	6.34	4.19	4.25	4.50	3.29	4.05
	% Over Issue			0.0%	120.6%	45.9%	47.9%	56.6%	14.5%	40.7%
	Total Cost			\$593.14	\$450.79	\$463.57	\$580.36	\$312.96	\$352.18	\$538.35
	Avg. Cost Per Module			\$84.73	\$64.40	\$66.22	\$82.91	\$44.71	\$50.31	\$76.91
	Avg. Cost Per Meal			\$1.69	\$4.02	\$2.65	\$2.51	\$2.79	\$2.01	\$2.33
	% Cost Increase Per Meal			0.0%	137.5%	56.3%	48.3%	64.9%	18.8%	37.5%

\*Considered a component of another items and not included in the Total Entrée Portion count across all menus.



**Table B-2: UGR-A Item Portions by Item Level of Pack and Module Size (# Meals) – Lunch/Dinner Entrée**

Menu	Item*	Item Portions by Item Level of Pack and Module Size (# Meals)								
		Item Portions		No. Portions 50 Meal Module	Current Unit of Pack			With Unit of Pack Subunits		
		Unit of Pack	Subunits		16	25	33	16	25	33
L1	LOW SODIUM FRIED CHICKEN	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
L2	BEEF PATTIES, PRECOOKED	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
L2	BEEF FRANK	16.7	8.3	16.7	0.0	0.0	0.0	0.0	0.0	0.0
L2	CHILI WITH BEANS*	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
L3	BEEF BRISKET	12.5	12.5	25.0	25.0	25.0	12.5	25.0	25.0	12.5
L3	PORK, PORK IN BBQ SAUCE	25.0	25.0	25.0	0.0	0.0	25.0	0.0	0.0	25.0
L4	TURKEY CUTLET	50.0	10.0	50.0	50.0	50.0	50.0	20.0	30.0	40.0
L5	CHINESE BEEF & VEG/GENERAL TSO CHICKEN	50.0	25.0	50.0	50.0	50.0	50.0	25.0	25.0	50.0
L6	SHRIMP SCAMPI WITH PASTA	25.0	4.2	25.0	25.0	25.0	25.0	16.7	25.0	25.0
L6	PENNE ALFREDO W/BACON	25.0	6.3	25.0	0.0	0.0	25.0	0.0	0.0	12.5
L7	NY STRIP STEAK	50.0	10.0	50.0	50.0	50.0	50.0	20.0	30.0	40.0
L7	VEG, PEPPERS AND ONIONS, FROZEN.*	20.0	20.0	40.0	20.0	20.0	40.0	20.0	20.0	40.0
L8	PORK, RIB SLABS	25.0	25.0	25.0	0.0	0.0	25.0	0.0	0.0	25.0
L8	CHICKEN, JERK STYLE	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
L9	SAUSAGE SCALLOPINI	25.0	25.0	25.0	0.0	0.0	25.0	0.0	0.0	25.0
L9	MEATBALLS AND SAUCE	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
L10	ENCHILADA KIT	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
L11	TERIYAKI CHICKEN THIGHS / SPICY PORK WINGS	50.0	5.0	50.0	50.0	50.0	50.0	20.0	25.0	35.0
L12	BURGUNDY BEEF RIBS	50.0	10.0	50.0	50.0	50.0	50.0	20.0	30.0	40.0
L13	BEEF PRIME RIB	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
L14	CHICKEN CORDON BLEU	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
L15	BUFFALO MAC & CHEESE	25.0	6.3	25.0	25.0	25.0	25.0	18.8	25.0	12.5
L15	TOMATILLO PORK/PRESSED FLOUR TORTILLAS	25.0	25.0	25.0	0.0	0.0	25.0	0.0	0.0	25.0
L15	POBLANO CORN CHOWDER	25.0	12.5	25.0	25.0	25.0	25.0	12.5	12.5	25.0
L16	MINI MEATLOAF IN SAUCE	50.0	10.0	50.0	50.0	50.0	50.0	20.0	30.0	40.0
	Total Portions*			825.0	683.3	683.3	795.8	481.3	540.8	715.8
	Avg. Portions Per Menu			51.6	42.7	42.7	49.7	30.1	33.8	44.7
	Avg. Portions Per Meal			1.03	2.67	1.71	1.51	1.88	1.35	1.36
	% Over Issue			0.0%	158.8%	65.7%	46.2%	82.3%	31.1%	31.5%
	Total Cost			\$1,726.77	\$1,486.78	\$1,486.78	\$1,662.18	\$993.23	\$1,151.38	\$1,467.27
	Avg. Cost Per Module			\$107.92	\$92.92	\$92.92	\$103.89	\$62.08	\$71.96	\$91.70
	Avg. Cost Per Meal			\$2.16	\$5.81	\$3.72	\$3.15	\$3.88	\$2.88	\$2.78
	% Cost Increase Per Meal			0.0%	169.1%	72.2%	45.8%	79.7%	33.4%	28.7%

\*Considered a component of another items and not included in the Total Entrée Portion count across all menus.

Table B-3: UGR-A Item Portions by Item Level of Pack and Module Size (# Meals) – Breakfast Starch

Menu	Item	Item Portions		No. Portions 50 Meal Module	Item Portions By Item Level of Pack and Module Size (# Meals)					
		Unit of Pack	Subunits		Current Unit of Pack			With Unit of Pack Subunits		
					16	25	33	16	25	33
B1	HOMINY GRITS, INSTANT	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
B1	GOLDEN MAPLE OATMEAL	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
B2	HASHBROWNS	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B2	BUTTERMILK BISCUIT, FROZEN, TFF	50.0	10.0	50.0	50.0	50.0	50.0	20.0	30.0	40.0
B3	HASHBROWNS	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B3	APPLE CINNAMON OATMEAL	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
B4	HOMINY GRITS, INSTANT	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
B4	BUTTERMILK BISCUIT, FROZEN, TFF	50.0	10.0	50.0	50.0	50.0	50.0	20.0	30.0	40.0
B4	NUTRIGRAIN BAR	48.0	8.0	48.0	48.0	48.0	48.0	16.0	24.0	32.0
B5	HASHBROWNS	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B6	GOLDEN MAPLE OATMEAL	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
B6	HASHBROWNS	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B6	WHOLE GRAIN MUFFIN	24.0	24.0	48.0	24.0	24.0	48.0	24.0	24.0	48.0
B7	HOMINY GRITS, INSTANT	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
B7	APPLE CINNAMON OATMEAL	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
B7	APPLE FILLED BAGEL	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
B7	POTATO PANCAKE	50.0	16.7	50.0	50.0	50.0	50.0	16.7	33.3	33.3
	Total Portions			716.0	617.0	617.0	716.0	491.7	536.3	663.3
	Avg. Portions Per Menu			102.3	88.1	88.1	102.3	70.2	76.6	94.8
	Avg. Portions Per Meal			2.05	5.51	3.53	3.10	4.39	3.06	2.87
	% Over Issue			0.0%	169.3%	72.3%	51.5%	114.6%	49.8%	40.4%
	Total Cost			\$134.83	\$126.48	\$126.48	\$134.83	\$88.51	\$101.28	\$119.60
	Avg. Cost Per Module			\$19.26	\$18.07	\$18.07	\$19.26	\$12.64	\$14.47	\$17.09
	Avg. Cost Per Meal			\$0.39	\$1.13	\$0.72	\$0.58	\$0.79	\$0.58	\$0.52
	% Cost Increase Per Meal			0.0%	193.1%	87.6%	51.5%	105.2%	50.2%	34.4%

Table B-4: UGR-A Item Portions by Item Level of Pack and Module Size (# Meals) – Lunch/Dinner Starch

Menu	Item	Item Portions		No. Portions 50 Meal Module	Item Portions by Item Level of Pack and Module Size (# Meals)					
		Unit of Pack	Subunits		Current Unit of Pack			With Unit of Pack Subunits		
					16	25	33	16	25	33
L2	POTATO WEDGE	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
L3	MACARONI AND CHEESE COMBO	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
L3	CORNBREAD JALAPENO	24.0	24.0	24.0	0.0	0.0	24.0	0.0	0.0	24.0
L3	CORNBREAD PLAIN	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
L4	HERB & BUTTER MASHED POTATOES	16.7	16.7	50.0	16.7	33.3	33.3	16.7	33.3	33.3
L4	MAPLE GLAZED SWEET POTATOES	50.0	12.5	50.0	50.0	50.0	50.0	25.0	25.0	37.5
L4	STUFFING MIX, CORNBREAD	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
L5	RICE INSTANT 24 OZ BOX	16.7	16.7	50.0	16.7	33.3	33.3	16.7	33.3	33.3
L7	NATURAL POTATO WEDGE	16.7	16.7	50.0	16.7	33.3	33.3	16.7	33.3	33.3
L8	AU GRATIN POTATO	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
L9	PASTA, SPAGHETTI, DRY, THIN, LONG, BOX	8.3	8.3	50.0	16.7	25.0	33.3	16.7	25.0	33.3
L9	PIZZA ROLL	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
L10	RICE, MEXICAN	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
L10	MEXICAN CHILI BEANS	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
L11	PRIMAVERA RICE	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
L12	HERB & BUTTER MASHED POTATOES	16.7	16.7	50.0	16.7	33.3	33.3	16.7	33.3	33.3
L13	ROASTED GARLIC MASHED POTATOES	16.7	16.7	50.0	16.7	33.3	33.3	16.7	33.3	33.3
L14	RICE PILAF	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
L15	RICE INSTANT 24 OZ BOX	16.7	16.7	50.0	16.7	33.3	33.3	16.7	33.3	33.3
L16	LOADED MASHED POTATOES	50.0	10.0	50.0	50.0	50.0	50.0	20.0	30.0	40.0
	Total Portions			944.0	561.7	670.0	827.3	506.7	625.0	804.8
	Avg. Portions Per Menu			59.0	35.1	41.9	51.7	31.7	39.1	50.3
	Avg. Portions Per Meal			1.18	2.19	1.68	1.57	1.98	1.56	1.52
	% Over Issue			0.0%	85.9%	41.9%	32.8%	67.7%	32.4%	29.2%
	Total Cost			\$216.29	\$157.97	\$172.05	\$201.37	\$117.97	\$139.09	\$184.89
	Avg. Cost Per Module			\$13.52	\$9.87	\$10.75	\$12.59	\$7.37	\$8.69	\$11.56
	Avg. Cost Per Meal			\$0.27	\$0.62	\$0.43	\$0.38	\$0.46	\$0.35	\$0.35
	% Cost Increase Per Meal			0.0%	128.2%	59.1%	41.1%	70.4%	28.6%	29.5%

Table B-5: UGR-A Item Portions by Item Level of Pack and Module Size (# Meals) – Breakfast Dessert

Menu	Item	Item Portions		No. Portions 50 Meal Module	Item Portions by Item Level of Pack and Module Size (# Meals)					
		Unit of Pack	Subunits		Current Unit of Pack			With Unit of Pack Subunits		
					16	25	33	16	25	33
B1	CINNAMON ROLL W/ ICING	15.0	15.0	45.0	15.0	30.0	30.0	15.0	30.0	30.0
B1	FROSTED BLUEBERRY TOASTER PASTRY	40.0	8.0	40.0	40.0	40.0	40.0	16.0	24.0	32.0
B2	SHELF STABLE BLUEBERRY MUFFIN	15.0	15.0	45.0	15.0	30.0	30.0	15.0	30.0	30.0
B3	MINI DANISH	24.0	24.0	48.0	24.0	24.0	48.0	24.0	24.0	48.0
B4	CARAMEL APPLE COFFEE CAKE	17.0	17.0	51.0	17.0	34.0	34.0	17.0	34.0	34.0
B5	DONUT, POWDER SUGAR	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
B5	WHOLE GRAIN BROWN SUGAR TOASTER PASTRY	8.0	8.0	40.0	16.0	24.0	42.0	16.0	24.0	32.0
B6	FRENCH TOAST COOKIE	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
B7	WHOLE GRAIN STRAWBERRY TOASTER PASTRY	8.0	8.0	40.0	16.0	24.0	32.0	16.0	24.0	32.0
Total	Total Portions			277.0	159.0	206.0	230.0	135.0	190.0	222.0
	Avg. Portions Per Menu			39.6	22.7	29.4	32.9	19.3	27.1	31.7
	Avg. Portions Per Meal			0.79	1.42	1.18	1.00	1.21	1.09	0.96
	% Over Issue			0.0%	79.4%	48.7%	25.8%	52.3%	37.2%	21.4%
Total	Total Cost			\$159.90	\$84.30	\$116.42	\$131.42	\$76.88	\$111.47	\$125.31
	Avg. Cost Per Module			\$22.84	\$12.04	\$16.63	\$18.77	\$10.98	\$15.92	\$17.90
	Avg. Cost Per Meal			\$0.46	\$0.75	\$0.67	\$0.57	\$0.69	\$0.64	\$0.54
	% Cost Increase Per Meal			0.0%	64.7%	45.6%	24.5%	50.2%	39.4%	18.7%

**Table B-6: UGR-A Item Portions by Item Level of Pack and Module Size (# Meals) – Lunch/Dinner Dessert**

Menu	Item	Item Portions		No. Portions 50 Meal Module	Item Portions by Item Level of Pack and Module Size (# Meals)					
		Unit of Pack	Subunits		Current Unit of Pack			With Unit of Pack Subunits		
					16	25	33	16	25	33
L1	CHOCOLATE PUDDING CUPS	4.0	4.0	48.0	16.0	24.0	32.0	16.0	24.0	32.0
L1	APPLE CINNAMON TAQUITO	24.0	24.0	48.0	24.0	24.0	48.0	24.0	24.0	48.0
L1	FAMOUS AMOS OATMEAL RAISIN COOKIE	50.0	1.0	50.0	50.0	50.0	50.0	16.0	25.0	33.0
L2	PEACHES IN STRAWBERRY-BANANA SYRUP, IND CUP	24.0	4.0	48.0	24.0	24.0	48.0	16.0	24.0	32.0
L2	RICE KRISPIE TREAT	24.0	24.0	48.0	24.0	24.0	48.0	24.0	24.0	48.0
L2	CHOCOLATE CHUNK COOKIE	48.0	24.0	48.0	48.0	48.0	48.0	24.0	24.0	48.0
L3	APPLESAUCE, IND CUP	6.0	6.0	48.0	18.0	24.0	32.0	18.0	24.0	32.0
L3	CUPCAKE, ALMOND	15.0	15.0	45.0	15.0	30.0	45.0	15.0	30.0	45.0
L3	REESES PIECES	25.0	1.0	50.0	25.0	25.0	50.0	16.0	25.0	33.0
L4	BUTTERSCOTCH PUDDING CUPS	4.0	4.0	48.0	16.0	24.0	32.0	16.0	24.0	32.0
L4	HARVEST PUMPKIN CAKE	17.0	17.0	51.0	17.0	34.0	34.0	17.0	34.0	34.0
L5	PINEAPPLE COCONUT CAKE	17.0	17.0	51.0	17.0	34.0	34.0	17.0	34.0	34.0
L5	DICED PEARS, IND CUP	48.0	4.0	48.0	48.0	48.0	48.0	16.0	24.0	32.0
L5	CANDY COATED DISK	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
L6	AMARETTO CREAM CAKE	18.0	18.0	54.0	18.0	36.0	36.0	18.0	36.0	36.0
L6	LITE MIXED FRUIT, INDCUP	24.0	4.0	48.0	24.0	24.0	24.0	16.0	24.0	42.0
L6	FAMOUS AMOS CHOC CHIP COOKIE	50.0	1.0	50.0	50.0	50.0	50.0	16.0	25.0	33.0
L7	VANILLA PUDDING CUPS	4.0	4.0	48.0	16.0	24.0	32.0	16.0	24.0	32.0
L7	CHOCOLATE CAKE W/ CHOCOLATE ICING	18.0	18.0	54.0	18.0	36.0	36.0	18.0	36.0	36.0
L8	DICED PEARS, IND CUP	48.0	4.0	48.0	48.0	48.0	48.0	16.0	24.0	32.0
L8	SWEET POTATO PIE	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
L9	LITE MIXED FRUIT, IND CUP	24.0	4.0	48.0	24.0	24.0	48.0	16.0	24.0	32.0
L9	RASPBERRY LEMON CAKE	16.0	16.0	48.0	16.0	32.0	32.0	16.0	32.0	32.0
L10	CHOCOLATE PUDDING CUPS	4.0	4.0	48.0	16.0	24.0	32.0	16.0	24.0	32.0
L10	FAMOUS AMOS CHOC CHIP COOKIE	50.0	1.0	50.0	50.0	50.0	50.0	15.0	25.0	33.0
L10	APPLE PIE, INDIVIDUAL SLICES	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
L11	MIXED FRUIT IN CHERRY SYRUP, IND CUP	24.0	4.0	48.0	24.0	24.0	48.0	16.0	24.0	32.0
L11	CHOCOLATE CHUNK MACADAMIA	48.0	24.0	48.0	48.0	48.0	48.0	24.0	24.0	48.0
L12	FAMOUS AMOS OATMEAL RAISIN COOKIE	50.0	1.0	50.0	50.0	50.0	50.0	16.0	25.0	33.0
L12	APPLESAUCE, IND CUP	6.0	6.0	48.0	18.0	24.0	32.0	18.0	24.0	32.0

Table B-6: UGR-A Item Portions by Item Level of Pack and Module Size (# Meals) – Lunch/Dinner Dessert

Menu	Item	Item Portions		No. Portions 50 Meal Module	Item Portions by Item Level of Pack and Module Size (# Meals)					
		Unit of Pack	Subunits		Current Unit of Pack			With Unit of Pack Subunits		
					16	25	33	16	25	33
L12	TURTLE BROWNIE	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
L13	VANILLA PUDDING CUPS	4.0	4.0	48.0	16.0	24.0	32.0	16.0	24.0	32.0
L13	CUPCAKES, ASSORTED VANILLA & DEVIL'S FOOD	48.0	12.0	48.0	48.0	48.0	48.0	24.0	24.0	36.0
L14	PEACHES IN STRAWBERRY-BANANA SYRUP, IND CUP	24.0	4.0	48.0	24.0	24.0	48.0	16.0	24.0	32.0
L14	CHEESECAKE, ASSORTED	48.0	12.0	48.0	48.0	48.0	48.0	24.0	24.0	32.0
L15	DULCE DE LECHE CHEESECAKE BITES	48.0	8.0	48.0	48.0	48.0	48.0	16.0	24.0	32.0
L15	CANDY COATED DISK W/ PEANUT	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
L16	DICED PEARS, IND CUP	48.0	4.0	48.0	48.0	48.0	48.0	16.0	24.0	32.0
L16	COOKIE DOUGH W/ CANDY COATED DISKS	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Total	Total Portions			1899.0	1284.0	1437.0	1677.0	874.0	1145.0	1454.0
	Avg. Portions Per Menu			118.7	80.3	89.8	104.8	54.6	71.6	90.9
	Avg. Portions Per Meal			2.37	5.02	3.59	3.18	3.41	2.86	2.75
	% Over Issue			0.0%	111.3%	51.3%	33.8%	43.8%	20.6%	16.0%
Total	Total Cost			\$823.06	\$597.36	\$659.18	\$749.57	\$417.66	\$523.32	\$658.75
	Avg. Cost Per Module			\$51.44	\$37.33	\$41.20	\$46.85	\$26.10	\$32.71	\$41.17
	Avg. Cost Per Meal			\$1.03	\$2.33	\$1.65	\$1.42	\$1.63	\$1.31	\$1.25
	% Cost Increase Per Meal			0.0%	126.8%	60.2%	38.0%	58.6%	27.2%	21.3%

**Table B-7: UGR-A Item Portions by Item Level of Pack and Module Size (# Meals) – Breakfast Accessories**

Menu	Item	Item Portions		No. Portions 50 Meal Module	Item Portions by Item Level of Pack and Module Size (# Meals)					
		Unit of Pack	Subunits		Current Unit of Pack			With Unit of Pack Subunits		
					16	25	33	16	25	33
All	CUPS, PAPER, HOT/COLD, 8 OZ NONWHITE, 100 CT	25.0	25.0	100.0	25.0	50.0	75.0	25.0	50.0	75.0
All	DINING PACKET	25.0	1.0	50.0	25.0	25.0	50.0	16.0	25.0	33.0
All	TRAY, MESS, 5 COMPARTMENT, NONWHITE	25.0	25.0	50.0	25.0	25.0	50.0	25.0	25.0	50.0
All	TRASH BAG, DEGRADABLE	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All	GLOVES	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Total	Total Cost			\$147.67	\$74.17	\$79.14	\$142.70	\$62.42	\$79.14	\$120.52
	Avg. Cost Per Module			\$21.10	\$10.60	\$11.31	\$20.39	\$8.92	\$11.31	\$17.22
	Avg. Cost Per Meal			\$0.42	\$0.66	\$0.45	\$0.62	\$0.56	\$0.45	\$0.52
	% Cost Increase Per Meal			0.0%	56.9%	7.2%	46.4%	32.1%	7.2%	23.7%

**Total Portions** – The total number of item portions summed across all menus for either lunch/dinner or breakfast. (For example, could be the sum of breakfast entrée portions from menu B1, B2, B3, etc.)

**Avg. Portions per Menu** – The average number of item portions per menu;; this is equal to the total portion divided by the number of menus.

**Avg. Portions per Meal** – The average number of portions per meal is the number of portions in a menu divided by the module size. This number will change depending on the hypothetical module size: 16, 25, or 33.

**% Over Issue** – This metric calculates the percentage of portions per meal in excess of what is present in the standard 50 meal module.

**Total Cost** – The total cost across all menus.

**Avg. Cost per Module** – The average cost across all menus.

**Avg. Cost per Meal** – The average cost per meal across all menus.

**% Cost Increase per Meal** – The percent cost increase per meal in comparison to the cost per meal of the standard 50 meal module.

To help illustrate these rules, Figures B-1 through Figure B-10 show hypothetical menu item packing situations, based on the hypothetical UGR-A module shown in Figure 2, under the following five different example scenarios:

1. Single Item, One Unit of Pack, No Subunits (Figure B-1):

For lunch/dinner menu 1, the 50 meal module consists of a single item, fried chicken, with one unit of pack with 50 portions and no subunits. This results in 50 portions for all six module alternatives.

2. Single Item, One Unit of Pack, Subunits (Figure B-2):

For lunch/dinner menu 11 (Table B-2) the entrée consisted of one item, chicken teriyaki/spicy pork wings, with one unit of pack and 10 subunits (five portions each). The Option 1 16, 25, and 33 meal modules each received 50 portions. For the Option 2 modules, each received 20, 25, and 35 portions respectively.

3. Single Item, Multiple Units of Pack, No Subunits (Figure B-3):

For lunch/dinner menu 2 (Table B-4) the starch consisted of one item, POTATO WEDGE, that comes as two 25 portion units of pack with no subunits. This results in 25 portions for both 16 and both 25 alternative modules, and 50 portions for both 33 meal alternative modules.

4. Split Item, One Unit of Pack, Subunits (Figure B-4):

For lunch/dinner menu 5 (Table B-2) the entrée consisted of one split entrée, CHINESE BEEF & VEG/GENERAL TSO CHICKEN, that comes as one unit of pack with two subunits of 25 entrées. The Option 1 16, 25, and 33 meal modules each receive 50 portions. The Option 2 modules each receive 25, 25, and 50 portions respectively.

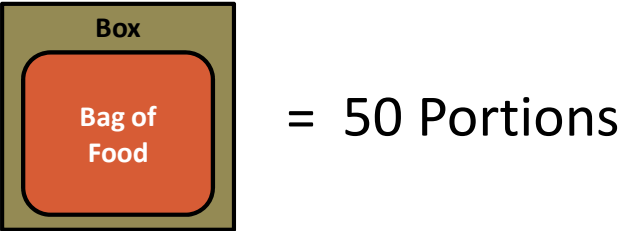
5. Multiple Items, Subunits (Figure B-5 through Figure B-10):

For breakfast menu 2 (Table B-1) the entrées consist of “EGG MIX BUTTER FLAVOR”, “BREAKFAST CHICKEN FILLET”, “BONELESS HAM STEAK”, and “BREAKFAST CHEDDAR SAUCE.” For the 16 and 25 portion Option 1 alternative menus, each contain 50, 50, 0, and 50 portions of the previously listed items, respectively. The 33 portion Option 1 alternative menu contains 50, 50, 36, and 50 portions respectively. The 16 and 25 portion Option 2 alternative menus each contain 25, 50, 0, and 50 portions respectively. Finally, the 33 portion Option 2 alternative menu contains 50, 50, 36, and 50 portions respectively.

Once the rules were applied and menus broken down, then summary cost and portions metrics were calculated and provided at the bottom of Table B-1 through Table B-7. The metrics provided show the extent of each item type’s contribution to meal cost and meal portions. They also show the extent of excess item portions that are included in the alternative module sizes and the cost-per-meal increase created by extra portions.



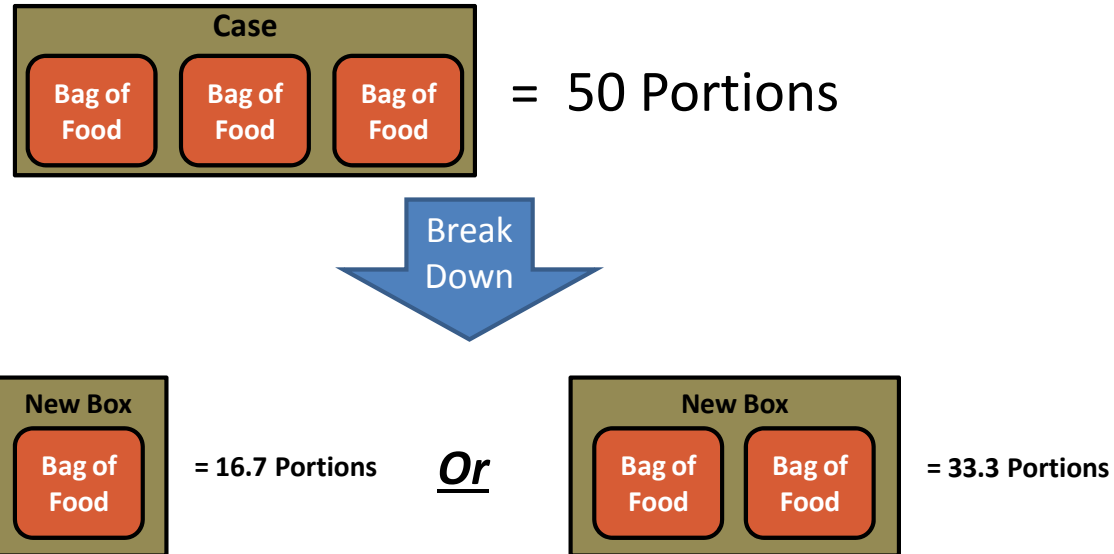
# Division Rules: Single Item, No Subunits



Item Portions by Item Level of Pack and Module Size (# Meals)					
Current Unit of Pack			With Unit of Pack Subunits		
16	25	33	16	25	33
50	50	50	50	50	50

Figure B-1: Division Rules: Single Item, No Subunits

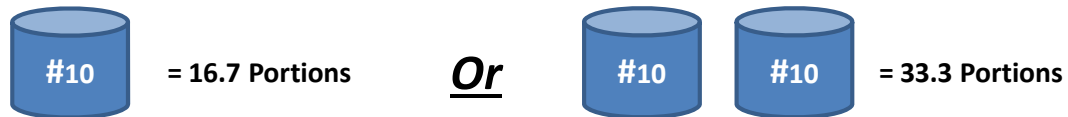
# Division Rules: Single Item with Subunits



Item Portions by Item Level of Pack and Module Size (# Meals)					
Current Unit of Pack			With Unit of Pack Subunits		
16	25	33	16	25	33
50	50	50	16.7	33.3	33.3

Figure B-2: Division Rules: Single Item with Subunits

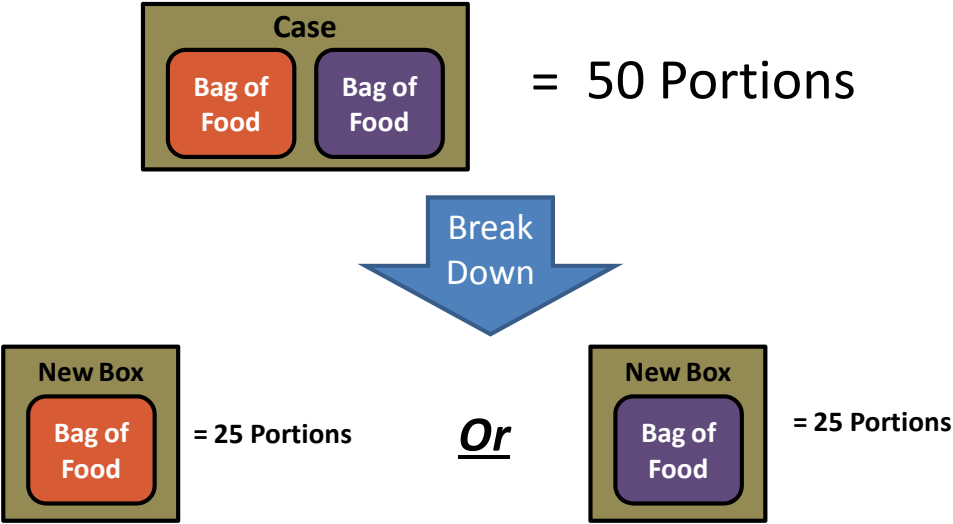
## Division Rules: Single Item, Multiple Units of Pack, No Subunits



Item Portions by Item Level of Pack and Module Size (# Meals)					
Current Unit of Pack			With Unit of Pack Subunits		
16	25	33	16	25	33
16.7	33.3	33.3	16.7	33.3	33.3

Figure B-3: Division Rules: Single Item, Multiple Units of Pack, No Subunits

# Division Rules: Split Item, 1 Unit of Pack, Subunits



Item Portions by Item Level of Pack and Module Size (# Meals)					
Current Unit of Pack			With Unit of Pack Subunits		
16	25	33	16	25	33
50	50	50	25	25	50

Figure B-4: Division Rules: Split Item, One Unit of Pack, Subunits

## Division Rules: Multiple Items, Subunits (1 of 6)

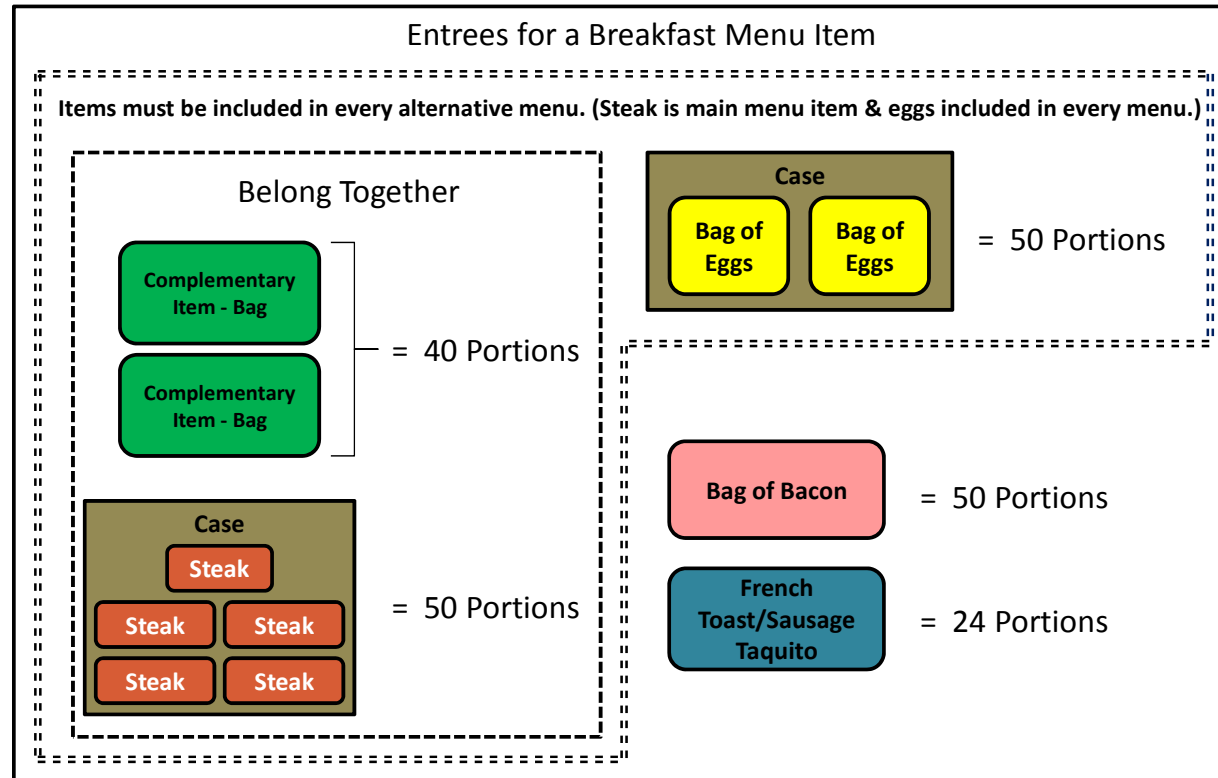
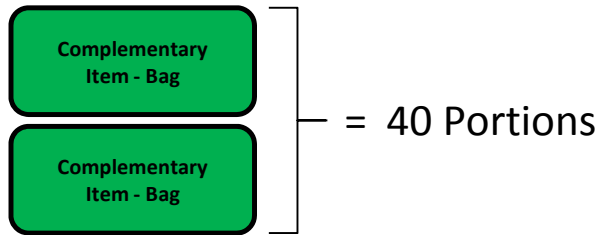


Figure B-5: Division Rules: Multiple Items, Subunits (1 of 6)

# Division Rules: Multiple Items, Subunits (2 of 6)

## *Calculating the entrée item fill rate...*

Complement Fill Rate:



Complement Fill Rate...  
 $40 \text{ Portions} / 50 \text{ Portions of Steak} =$   
***0.8 Portions per Portion of Steak***

Fill rate...

$174 \text{ Portions} / 50 \text{ Meals} =$   
***3.48 Entrée Portions per Meal***

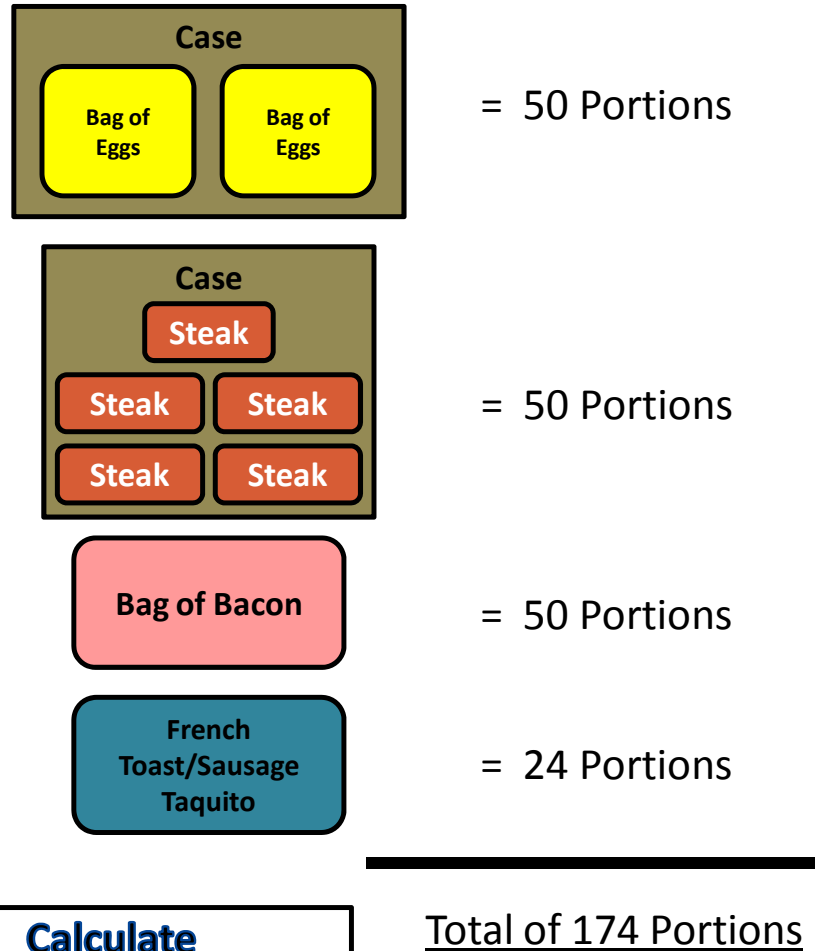


Figure B-6: Division Rules: Multiple Items, Subunits (2 of 6)

## Division Rules: Multiple Items, Subunits (3 of 6)

Fill Rate Requirements by Module Size:

- 16 meals x 3.48 portions per meal = 55.68
- 25 meals x 3.48 portions per meal = 87.00
- 33 meals x 3.48 portions per meal = 114.84

Fill rate for items that must be included:

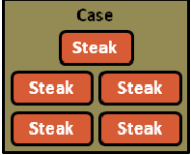
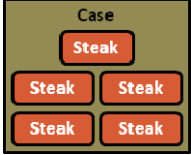


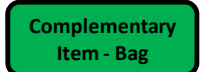
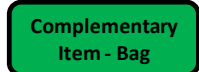
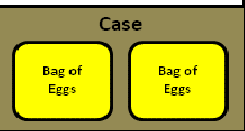





- Steak – 50 portions/50 meals = 1 portion per meal
- Complement to Steak – 0.8 portions per portion of steak
- Eggs – 50 portions/50 meals = 1 portion per meal

Fill rate for other items

- Bacon – 50 portions/50 meals = 1 portion per meal
- French toast/Sausage taquitos – 24 portions/50 meals = 0.48 portions per meal

Figure B-7: Division Rules: Multiple Items, Subunits (3 of 6)

# Division Rules: Multiple Items, Subunits (4 of 6)

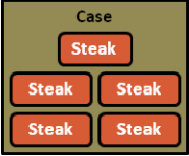
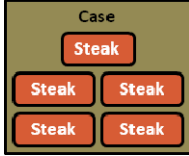
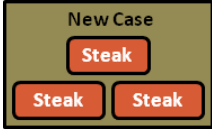

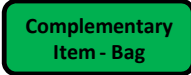
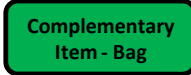
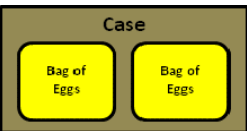






16 Man Module					
Item	Item Portions	Fill Rate	Minimum Portions	Current Unit of Pack	Unit of Pack Subunits
	50	1	16	 = 50 Portions	 = 20 Portions
	40	N/A	12.8	 = 20 Portions	 = 20 Portions
	50	1	16	 = 50 Portions	 = 25 Portions
	50	1	0	None	None
	24	0.48	0	None	 = 24 Portions

Need at least 55.68 portions including mandatory items, not including complementary items.

Figure B-8: Division Rules: Multiple Items, Subunits (4 of 6)



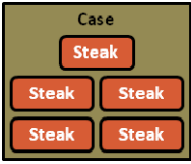
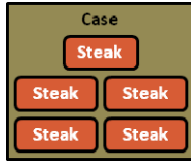

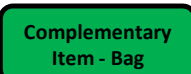
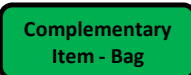
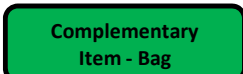
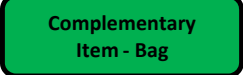

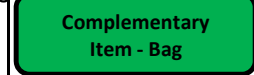
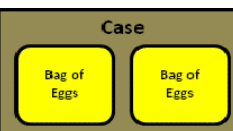
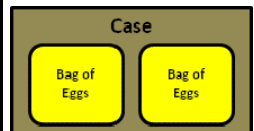





# Division Rules: Multiple Items, Subunits (5 of 6)

25 Man Module					
Item	Item Portions	Fill Rate	Minimum Portions	Current Unit of Pack	Unit of Pack Subunits
	50	1	25	 = 50 Portions	 = 30 Portions
	40	N/A	20	 = 20 Portions	 = 20 Portions
	50	1	25	 = 50 Portions	 = 25 Portions
	50	1	0	None	 = 50 Portions
	24	0.48	0	 = 24 Portions	None

Need at least 87.00 portions including mandatory items, not including complementary items.

Figure B-9: Division Rules: Multiple Items, Subunits (5 of 6)

# Division Rules: Multiple Items, Subunits (6 of 6)

35 Man Module					
Item	Item Portions	Fill Rate	Minimum Portions	Current Unit of Pack	Unit of Pack Subunits
	50	1	33	 = 50 Portions	 = 40 Portions
 	40	N/A	26.4	 = 40 Portions 	 = 40 Portions 
	50	1	33	 = 50 Portions	 = 50 Portions
	50	1	0	 = 50 Portions	 = 50 Portions
	24	0.48	0	None	None

Need at least 114.84 portions including mandatory items, not including complementary items.

Figure B-10: Division Rules: Multiple Items, Subunits (6 of 6)